September 2024

Master Plans of Urban Centers of Khyber Pakhtunkhwa (Divisional and Selected District Headquarters)

Master Plan of Peshawar City 2042

Task C – Master Plan Strategic Scenario Development/Mapping

Urban Policy & Planning Unit
Planning & Development Dept.
Government of Khyber Pakhtunkhwa

PEPAC Pvt Ltd &
Associates

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EXECUTIVE SUMMARY

Located in the north-west, Khyber Pakhtunkhwa (KP) is the third-largest province of Pakistan by population. It has an average annual growth rate of 2.89% that is relatively higher than the national average of 2.40% estimated by the Pakistan Bureau of Statistics in 2017 whilst the urban population stood at 5.7 million. The urban growth of KP has grown rapidly mainly due to socio-political situation of the province brought by the Afghan influx and the law-and-order situation in the districts that abut Afghanistan. Subsequently, the urban centres in KP, especially Peshawar, are growing rapidly in haphazard and unplanned manner, mainly promoting ribbon development owing to lack of comprehensive planning initiatives by the Provincial and Local Governments.

Considering the challenging scenario, then Prime Minister of Pakistan (Mr. Imran Khan) has directed the provincial and local governments to prepare Master Plans of cities and towns that would inform and direct the urban growth, encourage high-density development while protecting the prime agricultural and environmentally significant land. The Urban Policy & Planning Unit of the Planning and Development Department, Government of KP has commissioned the preparation of Master Plans of Provincial, Divisional and District Headquarters of KP province. This initiative includes the preparation of Peshawar City Master Plan 2040 that would inform and direct the future growth of Peshawar city in a sustainable way to efficiently enhance its productivity and functioning whilst improving the quality of life of its residents. The PEPAC Pvt Ltd & Associates has been hired as the Consultant by UPPU to carry out the extensive exercise of the Peshawar City Master Plan 2042. In this regard, the Peshawar Master Planning/Scenario Development Report is the fourth deliverable of the project which has aimed to suggest sustainable, compact and environment friendly proposals for the future development of Peshawar urban centre.

Peshawar, being the provincial headquarter, is one of the major cities of Pakistan. However, owing to lack of integrated planning practices, this ancient city suffers from various deep-rooted urban problems especially massive urban sprawl and ad-hoc development. The government of Khyber Pakhtunkhwa had already developed and approved a district level plan for Peshawar which consists of comprehensive residential, commercial, agriculture, industrial, recreational, and other proposals. In that district plan, the government has proposed that the Peshawar city will grow in the southern direction while the northern side of the city and district will be preserved to protect the prime agriculture land and orchards.

The consultant has kept that in consideration while developing different proposals for Peshawar urban centre. The city was calculated to have the population of approximately 2.7 million in 2017 which has anticipated to have increased up to approximately 3.3 million in 2022 and will continue to increase up to approximately 6 million by 2042. Considering the increase of approximately 2.5 million in just 20 years, different zones have been proposed for development of Peshawar City. The proposed residential zones in the Peshawar Master Plan present a comprehensive and strategic solution to meet the city's housing demands through

2042. By leveraging housing supply from both the public and private real estate sectors, as well as infill development, the plan effectively accommodates the incremental population. For the remaining housing demand, the proposed zones are aligned with the Approved Provincial Land Use Plan of Peshawar (2019), ensuring that future growth is directed towards areas that support sustainable urban expansion.

The plan emphasizes land efficiency through a blend of compact development and sustainable growth, particularly through the Transit-Oriented Development (TOD) approach. This innovative strategy encourages high-density, mixed-use developments near public transport networks, promoting walkable, pedestrian-friendly communities that reduce the strain on infrastructure. A balanced combination of horizontal and vertical development—including multi-story housing—allows for optimal land use, providing ample housing while maintaining urban green spaces and other essential infrastructure.

Enhancing the urban environment, the plan proposes a significant increase in recreational spaces, from the current 839.90 acres to 951.76 acres by 2042. This includes neighborhood parks, urban forests, botanical gardens, and adventure parks, fostering an active and vibrant community. The zoning strategy allows for diverse recreational uses and emphasizes the creation of green corridors, promoting environmental sustainability and improving the city's livability.

To accommodate Peshawar's growing population and economic activity, the Master Plan designates 5,126.73 acres for commercial development, distributed across various zones. These zones are distributed across different types of development, including Proposed Commercial Zones (PLUP), Linear Commercial Development, and High-Density Mixed-Use Zones.

The Proposed Commercial Zones (PLUP), comprising 2,195.9 acres, are focused on creating concentrated commercial hubs along key roads such as Bari Road and Phandu Road. These zones are designed to integrate modern commercial activities with parking facilities to mitigate traffic congestion.

The Linear Commercial Development, covering 1,880.09 acres, aims to establish commercial corridors along primary and secondary roads, ensuring accessibility and a balanced distribution of commercial activities across the city. Lastly, the High-Density Mixed-Use Zone, spanning 1,050.31 acres, promotes ground-floor commercial spaces with upper residential or office units. This mixed-use development concept is intended to foster economic vibrancy while addressing the city's need for commercial space, housing, and sustainable urban growth. Each commercial area will allocate 10% of its land for parking to ease traffic issues and reduce on-street parking challenges.

The High-Order Central Facilities Zone, spanning 847 acres, is designed to accommodate key civic and institutional functions, including administrative offices, hospitals, universities, and cultural centers. This zone is strategically placed along the Bus Rapid Transit (BRT) system and

the proposed Ring Road to enhance connectivity and accessibility. The Master Plan envisions a gender-inclusive urban environment, with museums, theatres, and public spaces integrated to enrich the cultural fabric of the city.

In alignment with sustainable agriculture goals, the Master Plan advocates for conservation practices such as tunnel farming, agroforestry, and organic farming. Proposals to support local food systems and promote sustainable agriculture research are embedded in the zoning regulations, ensuring that prime agricultural land, especially in the northern part of the city, is preserved and utilized efficiently.

The Industry Comprehensive Proposal for Peshawar highlights the city's evolving industrial landscape, which plays a critical role in its economic growth. Covering an existing industrial area of 843.85 acres, the city also hosts key economic zones like the Peshawar Industrial Estate, Hayatabad Economic Zone, and the Pak-Afghan Economic Zone. These zones are integral to boosting industrial activities, creating jobs, and enhancing regional trade, particularly through the strategic opportunities presented by the China-Pakistan Economic Corridor (CPEC). With a focus on expanding advanced industrial facilities, such as automation plants and heavy industrial setups, Peshawar is positioning itself as a hub for both local and foreign investment, which will contribute to the city's economic stability and growth over the coming decades. The zoning regulations emphasize appropriate land uses for light-medium and medium industrial activities, ensuring safe, sustainable, and efficient industrial development.

The Master Plan for Peshawar proposes a comprehensive strategy to address healthcare needs by ensuring equitable access and sustainable infrastructure development. It includes the provision of 89.74 acres for neighborhood-level healthcare facilities, targeting underserved areas. The plan emphasizes expanding Basic Health Units (BHUs), dispensaries, and maternal and child healthcare centers, aiming to meet National Reference Manual (NRM) standards and WHO requirements for hospital beds. Zoning regulations are outlined to support health facilities, including hospitals, research centers, and support services, integrated with urban planning for better accessibility and future population growth.

The Master Plan for Peshawar also includes a significant expansion of educational facilities by designating 110.68 acres for new institutions to meet future demand. Emphasizing vertical development to optimize urban space, the plan focuses on creating accessible education zones with modern facilities, including schools, colleges, universities, research centers, and vocational institutions. The proposals aim to integrate education into the urban landscape while promoting land-use efficiency. Zoning regulations support the development of educational infrastructure, ensuring a balanced mix of educational, social, and community facilities to serve the growing population until 2042.

Since environment of the city is waning day by day, environment protection and improvement proposals have been given including marking of several conservation areas around the major roads, water channels and other areas, which shall be protected at all costs. In addition,

proposals in regard to conserving agriculture land within the city boundary, development of urban forests at various places, and improvement of areas of high pollution have been given.

Regarding water supply, sanitation, and sewerage, even though there are over 600 functional tube-wells within the city, they have been found wanting to meet the requirement of the coming 2.5 million population. The government has propositioned that since by constructing tube-wells, the water table of Peshawar city is dropping, therefore no more new tube-wells shall be proposed in Peshawar and rather, water should be supplied via Mohmand Dam to the city. However, since implementation of that plan is not expected immediately, the consultant has suggested few tube-wells and other related proposals to cater the demand of future population of proposed residential and commercial zones.

To improve the traffic congestion and transportation problems in Peshawar, the existing roads shall be improved along with construction of newly proposed roads. These interventions shall provide better connectivity in Peshawar city and would improve level of service of major roads. Moreover, the provision of footpaths and service lanes along major roads, improvement in junction geometry and public transport services shall improve the overall mobility and pedestrian movement within the city. Similarly, provision of on-street parking and its implementation, improvement of existing parking plazas, and construction of newly proposed parking plaza near commercial zones in future extension area shall aid in reducing traffic congestion and conflicts on major roads.

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List of Acronyms

GoKP	Government of Khyber Pakhtunkhwa
KP	Khyber Pakhtunkhwa
MC	Municipal Corporation
NC	Neighbourhood Council
NEAP	National Environmental Action Plan
NEQs	National Environmental Quality Standards
NGO	Non-Governmental Organisations
OHR	Overhead Reservoir
PASDEC	Pakistan Stone Development Company
PDA	Peshawar Development Authority
PDMA	Provincial Disaster Management Authority
PDSSP	Punjab Devolved Social Services Programme
PEA	Pakistan Environmental Agency
PEPC	Pakistan Environmental Protection Council
PPA	Provincial Protection Agencies
RBC	Reinforced Brick Concrete
RCC	Reinforced Cement Concrete
THQ	Tehsil Headquarter
TMA	Tehsil Municipal Authority
ToRs	Terms of Reference
UIB	Upper Indus Basin
UN	United Nations
UPPU	Urban Policy & Planning Unit
VC	Village Council
WSSP	Water and Sanitation Services Peshawar

Chapter 1: Project Background

1.1. Project Scope

Khyber Pakhtunkhwa (KP) is a province located in the northwest region of Pakistan. Despite Khyber Pakhtunkhwa (KP) is located in the northwest region of Pakistan. Despite having the smallest land area of 74,521 km^2, it is the third most populous province in the country, with a population of 30.5 million. In 1998, its population was 17.7 million, reflecting 2.89% per annum growth, which is higher than the national average of 2.40%. Several factors, such as high fertility rate and temporary and permanent internal migration, have contributed to the population growth in KP.

In view of the rising urbanization[1] and population growth the Urban Policy & Planning Unit of the Planning and Development Department, Government of KP, has commissioned the preparation of Master Plans for the development and planning of twenty urban centres in the Khyber Pakhtunkhwa Province, including the Provincial Capital, i.e., Peshawar City Master Plan 2042. These Master Plans shall act as development planning and policy intervention for sustained growth in line with the needs of the expanding population.

For the development and planning of Peshawar City Master Plan 2042, ***PEPAC Pvt Ltd & Associates*** has been hired as consultants for the project. Their scope of work includes suggesting development solutions for Peshawar City, after assessing its spatial, economic, and available resources.

Peshawar, the capital of Khyber Pakhtunkhwa in Pakistan, is the country's sixth-largest city. Situated in the central part of Khyber Pakhtunkhwa, Peshawar lies in the Peshawar Valley, predominantly inhabited by Pashtuns, the second-largest ethnic group in Pakistan.

Located in the eastern part of the historic Khyber Pass within the Valley of Peshawar, the city has a rich history dating back to at least 539 BCE, making it one of South Asia's oldest cities. Peshawar holds the distinction of being the capital of the Gandhara civilization, solidifying its status as one of the country's oldest continuously inhabited cities.

According to the Term of Reference (TOR), the scope of the project caters to the following tasks but is not limited to them:

- Identification of the study area boundary, demographic composition, ethnic and tribal makeup, customs, climate, and hydrology. A comprehensive socio-economic assessment of the current situation and identification of potential growth zones for future development.

[1] Definition of Urbanisation: The term "Urbanisation" describes the process through which a society takes on a more urban character. Typically, this process entails the growth and extension of cities, towns, and other urban regions, as well as a corresponding rise in the percentage of a population that resides in these areas. This can involve individuals moving from rural to urban regions, urban areas expanding due to natural population increase, building additional infrastructure and housing, and expanding economic activities including industry, commerce, and services.

- Identification/provision of amenities and infrastructure, including connectivity routes, industrial, commerce and trade zones, and Action Plan frameworks to support city's growth and development over a 20-year period.
- Development of an inception report outlining the project's abstract and methodological framework, vision and key stakeholders.
- In order to calculate the amount of land needed to accommodate the projected population growth, we will conduct land use and suitability analysis. This will involve mapping historical growth and housing trends, field surveys, analysing the existing urban structure, and creating sectoral profiles.
- Conducting scenario mapping, land use zoning, master planning for the city, and building implementation framework and action plan for specific areas.
- Maintain continuous coordination between the client, consultant, and associated stakeholders at every stage to ensure clarity and agreement on project deliverables.
- Outline timelines, budgeting, and stakeholder responsibilities for the smart implementation of the plan so that all processes are executed effectively and efficiently, for the sustainable development of each headquarters city in the study area.

1.2. Project Objectives

According to Project TOR's, the following specific objectives shall help attain the project's goals:

- Critical review of current policies and ongoing urban development schemes to identify its short comings, remove gaps and suggest appropriate changes.
- Assess the impact of urbanisation (population growth, re-classification and expansion in the urban boundaries) on the basic services and suggest strategies to keep pace with the urban growth.
- Examine the existing regulatory, institutional and governance framework, of the city and suggest improvements.
- Devise strategies for affordable housing and recreation facilities in the existing city and new areas;
- Devise strategies for urban regeneration/slum up gradation and encourage mixed-used high-density vertical development at appropriate locations within the existing urban core.
- Devise a policy framework and specific design guidelines to address local issues affecting intensification/densification.
- Assess the adequacy of municipal services (storm water, solid waste management, sewage treatment and municipal water supply) and social amenities such as (parks and playground, public and private transits, bus stops and terminals; roads capacities, junctions' improvement and parking facilities) to achieve the required levels of intensification.

- Suggest a legal, financial and technical mechanism for land acquisition for development in future.
- Strategize coordination among public/private institutions to carry out desired development in a coordinated manner (Proper development control mechanism).
- Strategies urban security issues.
- Provide strategies to conserve heritage and build the natural environments of the region.
- Strategies to explore and enhance urban tourism as an essential part of future urban economy.
- Strategies to improve revenue generation system and economic productivity of the institutions through identification of sources of tax and revenue generation such as land valuation and urban land taxation etc.
- Enhance connectivity and transit mobility to support and complement mixed-use high-rise development to reduce financial and environmental cost associated with traditional commuting.
- Strategies for the plan Implementation and establishing a system of monitoring and reviewing the plan proposals.

1.3. Milestones Reached

The master planning project for Peshawar city began with the submission and approval of the Inception Report, that contained a detailed methodology for the entire project. It was the first deliverable of the project and included contents of the master plan, adopted methodology, a list of various surveys and questionnaires.

The second deliverable, namely Vision Development and Public Consultation, was approved after detailed focus group discussions, SWOT analysis and interaction with relevant stakeholders and general public. The vision formulation exercise resulted in the formulation of a vision statement for the Peshawar City as ***"SMART, PROSPEROUS, SUSTAINABLE, CULTURALLY VIBRANT, TRADE HUB OF THE REGION".***

The third deliverable, named Background Study Report, has been successfully submitted to the client. The report covers a comprehensive analysis of primary surveys, which formed the basis for collecting data that was further analysed to provide insightful results. In addition, the report also included a detailed analysis of secondary reports, surveys, and relevant maps of each sector. An essential component of the report was an in-depth analysis of land use, which provided valuable insights regarding current land use patterns, trends, and potential areas for development.

On the basis of the aforementioned submitted and approved deliverables, the Master Plan and Scenario Mapping, which is the fourth deliverable of the projects, is currently being prepared. It will be submitted to the client after incorporating inputs from UPU, other stakeholders and a public hearing.

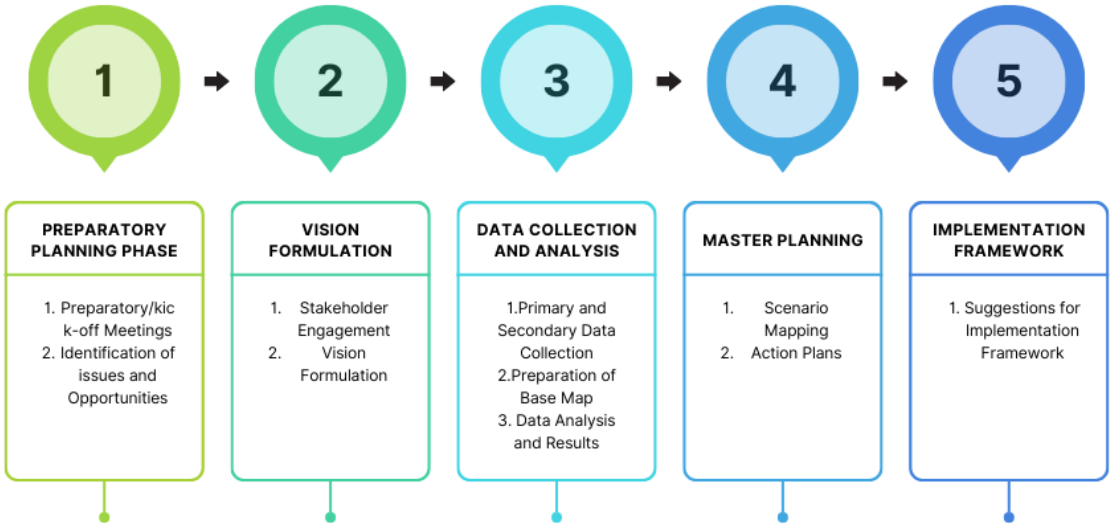
Following the approval of the master plan, the Sectoral Action Plans will be formulated as a final deliverable of the Master Plan of Peshawar City.

Chapter 2: Holistic Planning Approach

The holistic planning approach defines the overall procedure adopted for creating the Master Plan of Peshawar city. It broadly consists of five phases:

1. Preparatory Planning Phase
2. Vision Formulation
3. Data Collection & Analysis
4. Master Planning
5. Action Plans

Figure 1: Master Planning Methodology – Peshawar Study Area



The details of each step are defined in the following sections.

2.1. Preparatory Planning Phase

During the preparatory planning phase, the planning professionals laid the foundation for the planning exercise. Numerous dynamics of the study area were observed, and initial understandings regarding various sectors operating within the city were sketched. Stages covered during the preparatory planning of the master plan are defined below.

2.2.1. Preparatory/Kick off Meetings

For the formulation of the execution strategies of the master plan meetings were held with concerned personnel and planning experts involved in the project. The purpose of these meetings was to thoroughly analyse available options and pathways and choose the best economically and social feasible option for executing the plan.

2.2.2. Identification of Issues and Opportunities

During the kick-off meetings and various brainstorming sessions, we identified the challenges and issues that could potentially create risks and hinder the successful completion of the master planning exercise of the city. We also identified, key opportunities that arose from the project by taking into account several factors that were either directly or indirectly related to the master planning project. Additionally, we look at the different options available for project execution from a broad perspective at the city level, considering the specific pros and cons associated with each option.

2.2. Vision Formulation

The project's second stage involves the development of a vision for the next 20 years through active engagement of different stakeholders concerned with the master planning exercise. The core purpose of the visioning activity was to extract the agreed set of goals desired to be fulfilled through an extensive city planning exercise. A set of guiding questions and different community engagement tools and techniques, i.e., focus group discussions, was utilised to develop an agreed vision from various stakeholders.

2.3. Data Collection and Analysis

The next step included collection of primary and secondary data from the sampled population within the city. The primary data was mainly collected through the on-site surveys by the consultants, while the secondary data was acquired from different departments responsible for the active management of cities. Finally, the data was analysed through several statistical and visual modes and existing situations regarding different sectors altogether serving the city were identified. The detail process of data collection and analysis is provided in the section below.

2.3.1. Primary and secondary data collection

Two types of data were collected for execution of the master planning project. For the collection of primary data, the Kobo toolbox, a digital toolkit, was used, containing an approved questionnaire by the client. The main sectors included transportation, socioeconomic, land use, infrastructure and environment. Similarly, for secondary data collection, different departments directly or indirectly affecting the city management were approached, such as the taxation department, land management bodies, governance institutions, etc.

2.3.2. Preparation of Base Map

Geographical Information system (GIS) based land use base maps were prepared on the scale of RF 1:2000 to RF 1: 2500. They contain contour lines drawn at intervals of 05 meters along with jurisdictional boundaries of the area. All major roads, streets, railway lines, airports, water bodies, and residential areas (planned/unplanned) were mentioned on it.

The following elements are shown on the map:

- Contour lines drawn at an interval of 05 meters.
- Jurisdictional boundaries within the project area

- All major and minor streets, roads, railway lines and airports
- Water bodies (springs, streams, rivers and other water bodies)
- Residential areas (planned and un-planned areas building heights, density, mixed-use)
- Commercial areas (retail, wholesale and warehouses)
- Industrial areas (all types)
- Amenities (education, health, religious, banks, police stations, libraries, community halls etc.)
- Parks, playgrounds and green fields
- Open spaces (agriculture of all types, vacant, graveyards, etc.)
- Agricultural area
- Touristic spots
- Historical/heritage/places of interest

The step-wise base map formulation process is given below;

- The satellite imagery (Open Source - Landsat image) was used for performing supervised classification.
- Development of vector shape files in polygons, as these files were utilised to extract the areas.
- Digitization of selected areas at the parcel level.
- Allotment of a unique identification (ID) number to each parcel.
- Based on the ID number, the surveys were conducted at the NC/VC level. The NC/VCs are further divided into reasonable parts based on size or density.
- Reclassification of the map on the base of the survey.

2.3.3. Data Analysis and Results

After collecting the data, extensive analysis was performed using different tools and techniques to find the working capabilities of various sectors within the selected study area. Mainly, two sorts of research were performed: one was based on statistical manners, and the other was analysed by developing visual maps using Geographic Information Systems. The results from the analysis were presented using infographics generating comparisons among several indicators and sub-indicators selected for questionnaire formulation.

2.4. Master Planning

The final stage of the agreed project methodology includes developing a master plan through specific interventions, i.e., scenario mapping and action plans. Scenario mapping is majorly based on the primary studies and maps designed to highlight the existing situation of the study area. Aiding in defining policy measures for several sectors involved in overall city management. Furthermore, action plans will be proposed in which a specific set of actions and guidelines for each sector will be discussed.

2.4.1. Scenario Mapping

The scenario mapping is done through identifying the most suitable land parcels through performed multi-criteria analysis for various land uses. Housing projections for all income groups, spaces required for commercial and industrial activities and all other land demand

calculations are performed accordingly. The scenarios also cover identification of city's spatial urban form along with defining the range of land use potentials i.e., residential, commercial, agriculture, etc. Moreover, the major transportation, environmental and agricultural conservation areas are also identified to cater with the future city growth. A set of allied infrastructure to be provided in the city till the master plan duration have been proposed catering the expected city demands.

2.5. Action Plans

Action plans for several sectors, including quality of life, health, education, zoning and management, rural-urban fringe, heritage, zoning and land management, etc., will be prepared, devising policies and guidelines for dealing with the existing problems and covering the future demands of Peshawar city.

Chapter 3: City's Vision for Growth

3.1. Vision Formulation and Community Consultation

3.1.1. Theoretical/Conceptual Framework for Vision Formulation

Visioning entails capturing the aspirations of the residents of Peshawar in planning and development. It involves learning about the desires of the residents as to how they want their city to look in the coming years and decades. The participation of communities at the envisioning stage gives them a rare chance to overview the existing socio-economic, environmental and societal conditions of their cities. Further, it encourages them to consider their needs and challenges in discussions with the stakeholders and policymakers. Vision formulation does not only help identify goals and objectives but also involves charting the course and identifying the means required to reach the destination.

3.1.2. Models for Formulating Vision

For vision formulation, the consultant conducted focused group discussions (FGDs) with various stakeholders in the area, including civil society organizations, private and public Sector departments, and the general public. Participants freely talked about their requirements, The consultant has identified their shared values, purposes, and vision for the future of Peshawar, outlining their priorities, goals, and objectives associated with the entire master planning exercise.

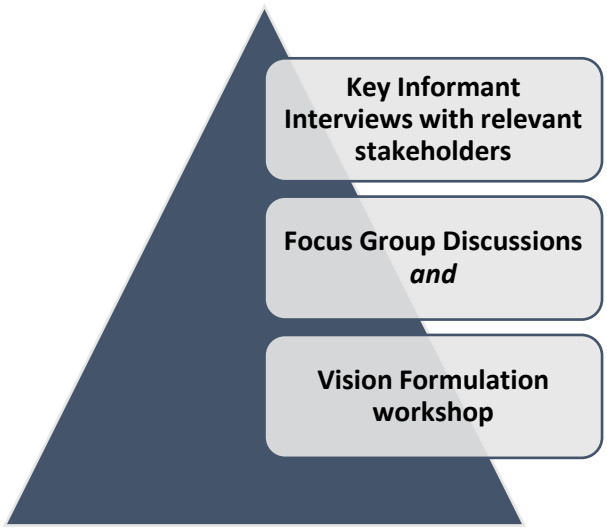
Figure 2: Models for Formulating Vision for Peshawar City

For the commencement of this project section, the Oregon Model was utilised, comprising four comprehensive steps for vision formulation. Each step is based upon questions and criteria about various activities, giving a specific outcome.

3.1.3. Adopted Vision Formulating Strategies

The methodology adopted for the visioning exercise comprised of a qualitative approach where problem-oriented reasoning was performed along with three staged strategies for vision formulation, including;

Figure 3: Adopted Vision Formulation Strategy – Urban Peshawar



The visioning process for Peshawar involved various tools such as interactive consultation sessions, focus group discussions (FGDs), and household questionnaires. Line departments were consulted to identify challenges and potential solutions, addressing issues in the city and highlighting opportunities for improvement (see Annexure 2 for visuals). Targeted discussions with the public, guided by TORs, used questionnaires with five key queries on the master planning project. This approach revealed critical issues, including inadequate municipal services, insufficient utilities, improper waste disposal, and shortcomings in education. Concerns extended to agricultural land loss, healthcare gaps, transportation challenges, and infrastructure issues. FGDs also uncovered the city's potentials in agriculture production and various industries. With government investment or private incentives, these could stimulate growth, create jobs, and enhance the quality of life. Economic prospects include the export potential of jaggery, chappal cloth, and Nephrite refinement, serving as vital contributors to the city's economic development.

3.1.4. Vision Development Workshop

The Peshawar Vision Formulation and Community Consultation was held on 6th January, 2022 at the University of Peshawar. Divided into eight groups, attendees conducted a SWOT analysis to identify strengths, weaknesses, opportunities, and threats for Peshawar City. Following this, each group formulated a consensus-based vision statement based on their SWOT analysis. The outcome produced eight distinct SWOT analyses and vision statements, ultimately leading to the development of a final, definitive vision statement for the city.

3.1.5. The Statement for Vision

"SMART, PROSPEROUS, SUSTAINABLE, CULTURALLY VIBRANT, TRADE HUB OF THE REGION"

Source: Devised by Consultants

3.1.6. SWOT Analysis of Peshawar

Table 1: SWOT Analysis Peshawar Study Area

Internal	**Strength**	**Weakness**
	• Regional & Administrative Capital of KP • Trade centers • Progressive of Education Institutions • Technical Training Institutes • Adequate and Quality Health Facilities • Bus Rapid Transit (BRT) facility • Diversified Cultural and heritage • Good Connectivity through air, rail and road network • Skilled Labor Force • SMEs	• Unplanned Development • Proliferation of Informal Settlements • Traffic Congestion • Poor Roads/Street Condition • Moderate Literacy rate • Poor Drainage & Sewerage System • Improper Solid Waste Management • Below-average Governance & Institutional Performance • Shortage of Sui Gas • Scarcity of Drinking Water • Lack of Parking Spaces • Encroachments • Air & Land Pollution • Drug Addiction
External	**Opportunities**	**Threats**
	• Epicenter of Regional Development • CPEC related Economic Activities • FDIs in Small industrial Estates • Connectivity with both national and international transportation network	• Influx of Afghan Refugees • Terrorism • Religious extremism • Smuggling • Urban Flooding • Climate Change

Source: Devised by Consultants

Chapter 4: Spatial Growth and Urban Form

4.1. Historical Background

The district of Peshawar is located in the central-western part of Khyber Pakhtunkhwa Province which is also the provincial capital of Khyber Pakhtunkhwa province. The district is located near the world's famous Khyber Pass, just 40 km west of the Durand Line: the international border between Pakistan and Afghanistan. Shaji-ki-Dheri is the site of an ancient Kanishka stupa about 6 kilometres east of Peshawar city (2nd century CE), attesting to the area's long association with the Buddha and Buddhism. The district was known as Parasawara, Purusapura, and Begram when it was the capital of the ancient Buddhist kingdom of Gandhara. Peshawar's current name is attributed to Akbar, India's Mughal emperor. Peshawar, a historic transit-caravan trade center with Afghanistan and Central Asia, is now connected by highway and rail to Lahore, Rawalpindi, Hyderabad, and other cities.

The Peshawar region is mentioned in early Sanskrit literature, and also in the writings of the ancient historians Strabo and Arrian, as well as the geographer named Ptolemy. The Vale of Peshawar was captured by the Greco-Bactrian monarch Eucratides in the second century BCE, and Kaniska made Purusapura the center of his Kushan (Kusana) kingdom (1st century CE). Buddhism was still prevalent when Chinese Buddhist monk and traveller Faxian travelled through the region in the 5th century CE. By the 16th century, the Afghans, who were ostensibly reliant on the Mughals, had taken control of the Muslim-captured city that had been taken in 988 CE. Sikh power had been deeply engrained by 1834. From 1849 to 1947, when it became a part of Pakistan, the region was governed by the British.[2]

4.2. Physical Background

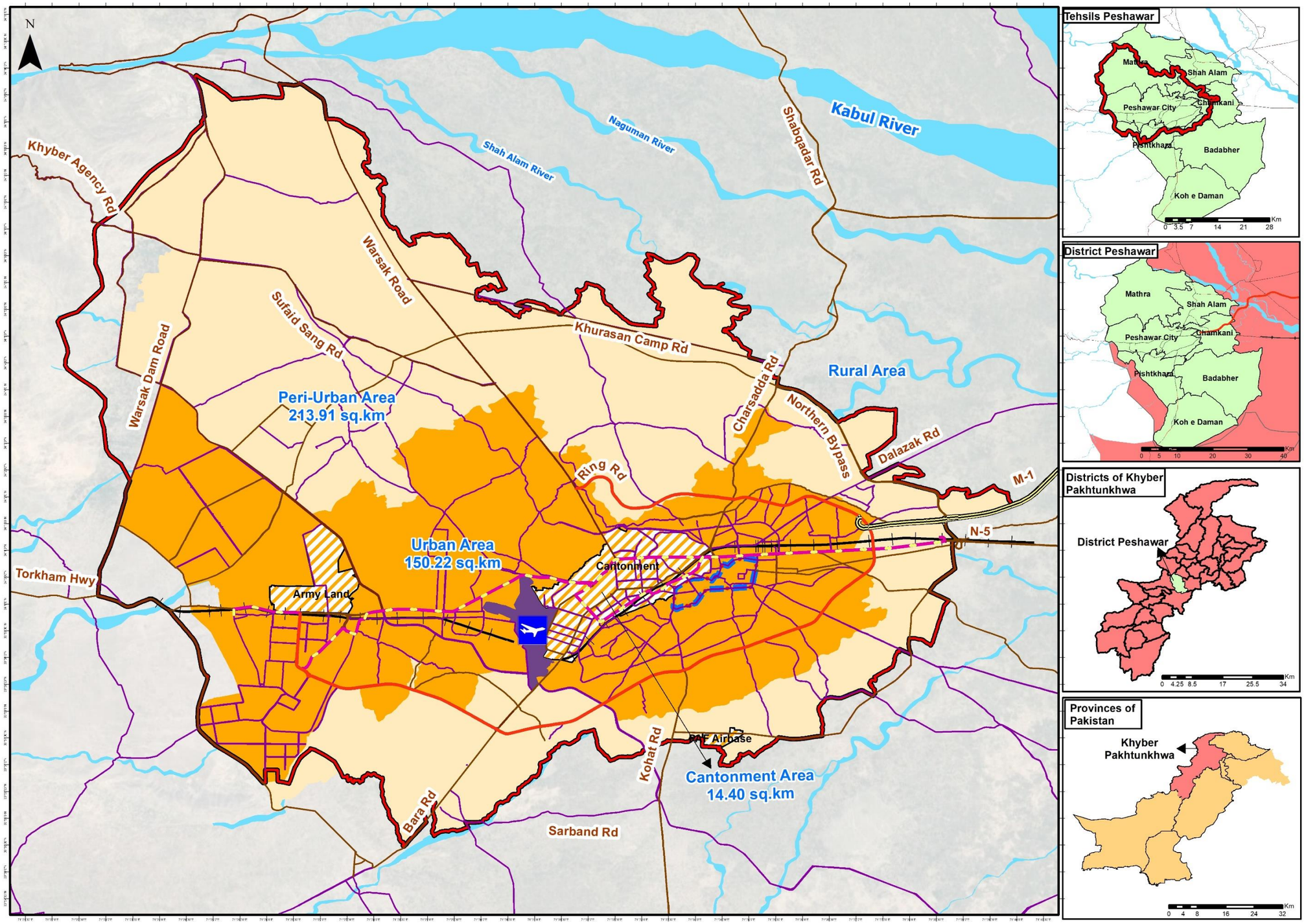
4.2.1. Geographical Setting

Peshawar City is located in the famous valley of Peshawar in the central-western part of the province, delimited by districts of Nowshera in the East, Charsadda in the North, the merged district Mohmand in the Northwest, and Khyber in the Southwest. The district is situated in the Peshawar Valley near the Eastern end of the world-famous and ancient Khyber Pass, neighbouring the Afghanistan border which is expanded towards the West. The recorded history of the city dates back to at least 539 BC, making it the ancient most living city in Pakistan and one of the oldest cities in South Asia[3].

Geographically Peshawar lies between 33◦ 44' and 34◦ 15' North latitude and 71◦ 22' and 71◦ 42' East longitude. The total area of the district is 1,257 square kilometres[4] (Pakistan Bureau of Statistics, 2017). According to the LGE &RDD[5] Peshawar district consists of 357 union councils which is further divided into 227 village councils and 130 neighbourhood councils.

[2] Britannica, Peshawar, Accessed from www.britannica.com/place/Peshawar, Accessed on 24 September 2022
[3] Peshawar: Oldest Living City in South Asia". Dawn. 3 July 2010. Retrieved on 24 September 2022
[4] Pakistan Bureau of Statistics 2017, Government of Pakistan.
[5] www.lgkp.gov.pk/districts/district-peshawar/

Map 1: Location Map of Peshawar Study Area with Respect to District, Province, and Country



Source: Survey of Pakistan Modified by the Consultant

4.2.2. Topography

Peshawar district is situated near the eastern end of the Khyber Pass and sits mainly on the Iranian plateau along. with the rest of the Khyber-Pakhtunkhwa. The Peshawar Vale (the greater Peshawar region consist of the district of Peshawar, Charsadda, Nowshera and Mardan) is covered with consolidated deposits of silt, sand and gravel of recent geological times. The areas between the Kabul River and Budin Nala consists of flood Plains/Zones. The meander flood plain extends from Warsak in the Northwest towards the Southeast in the upper Northern half of the district. The Kabul River enters the. district in the Northwest.

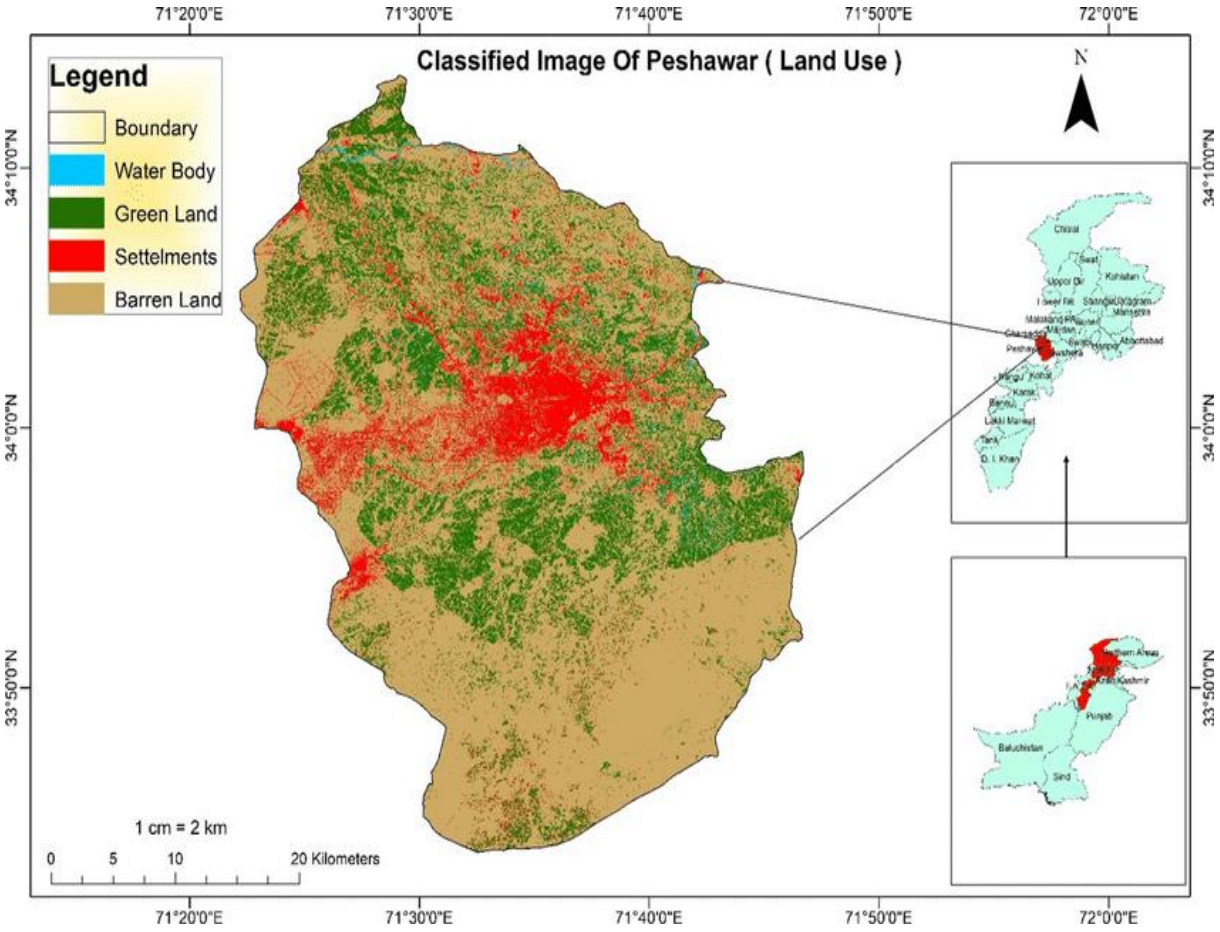
On entering the Peshawar Plain, the Kabul River split into several channels. Its two main distributaries are the Adizai and Nagoman rives. The Adizai River flows from west to east forming a boundary between Peshawar and Charsadda districts. Shah Alam is another important channel branching from the right bank of the Naguman River, which again merges with the Naguman River further. in the East. The sub-soil strata of District Peshawar are composed of gravels, boulders, and sands overlain by silts and clays. Sand, gravel, and boulders are important aquifers. that extends to a depth of about 200 feet (61 m) and further confined water-bearing aquifers occur at depths greater than 400 feet (120 m).[6]

4.2.3. Physiography

Except for the eastern region, the valley is surrounded by mountains, which are offshoots of the Hindu Kush Mountain ranges. In the east, these mountains. have a small opening near Attock through which the Kabul River drains into, the Indus River. The area of the valley does not include the tribal territories adjoining the districts, which is approximately 9583 sq. km, but with the tribal territories, the area increases to about 13 087 sq. km (Khurram. I *et al.* 2017).

[6] ADB (2017) Peshawar Sustainable Bus Rapid Transit Corridor Project

Figure 4: Physical Geography of Peshawar District[7]



Source: Basit, Abdul & Amin, Noor & Shah, Syed & Ahmad, Imran. (2022). Greenbelt conservation as a component of ecosystem, ecological benefits and management services: evidence from Peshawar City, Pakistan.

4.2.4. Geology and Soil

The region is underlain by river, stream, and floodplain deposits, which belong to the Pleistocene age, group. Such deposits constitute about 80% of the area of the Peshawar district. These are classed into four types i.e., Murree formation, Riverine, Quaternary Alluvium, and Samana Suk formation. Apart from these, about 20% of the area of the Peshawar district is covered by other rock types. These rocks are typically revealed in the outcrops to the West, Southwest, and South of the district. These include Tertiary Rocks, Jurassic Rocks, Palaeozoic Rocks, and Precambrian Rocks.[8]

In the plain, Quaternary deposit as old as 0.8 million years are present while in the north and north-west parts of Peshawar District, has riverine deposits of the Kabul River. In the south,

[7] Basit, A., Amin, N.U., Shah, S.T. *et al.* Greenbelt conservation as a component of ecosystem, ecological benefits and management services: evidence from Peshawar City, Pakistan. *Environ Dev Sustain* (2021). https://doi.org/10.1007/s10668-021-01890-3

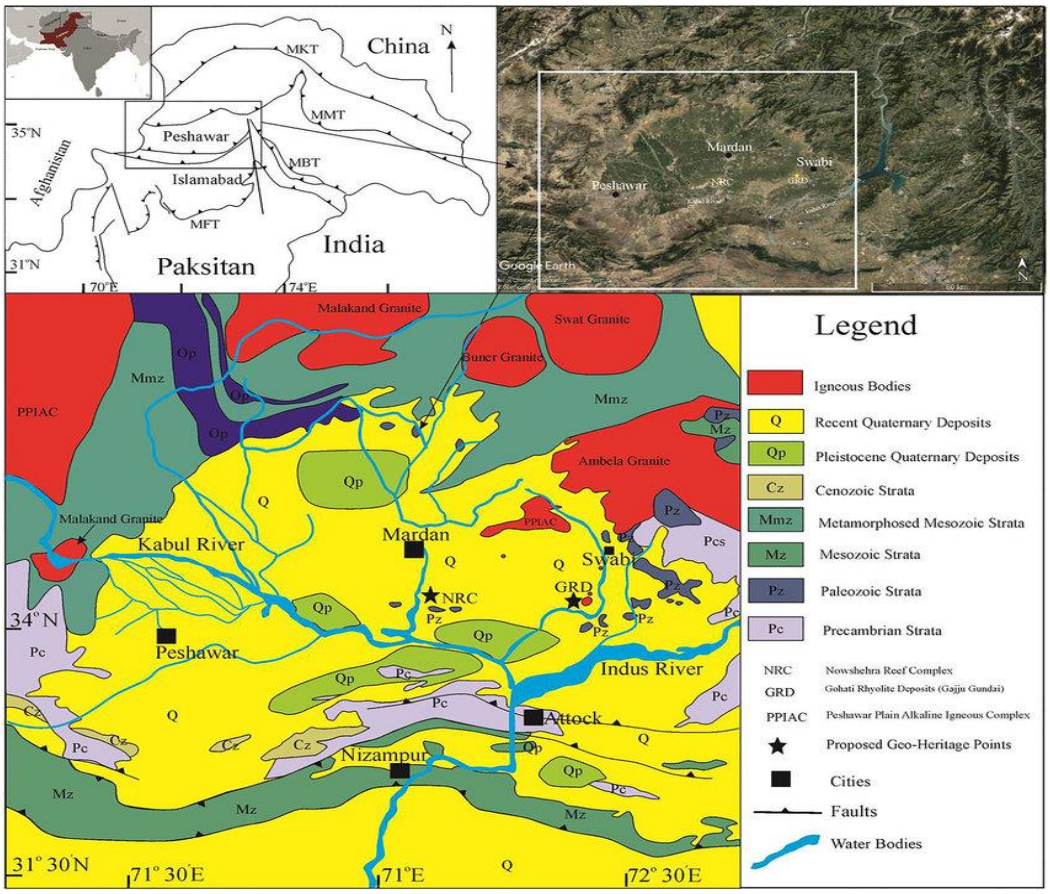
[8] Final Land Use Plan of Peshawar (2019)

Samana Suk formation is present along the Main Boundary Trust. There are outcrops of the Murree Formation to the south of Peshawar District.

About 80% of the area is covered by Landi kotal slate and Manki formation in Khyber area slate with subordinate argillaceous limestone intruded by dolorite dykes. Manki formation consists of dark grey, black thin bedded argillite sericite bearing slate, phyllite and subordinate lenses of limestone, gravel sand, and silt which has a bearing capacity in the range of 7-8 tons per sq ft for gravel and 0.2-0.3 tons per sq ft for clay soil with a low water table. Therefore, as far as geology is concerned, the district area is suitable for urbanization, provided other factors permit it.[9]

The geology of the Peshawar Valley is diverse, and its geological history is closely related to the Great Himalayan Mountains. The mountains surrounding the valley date from the Tertiary period. No fossils are known from this area. The Kabul River has a complex basin system. Sedimentary limestones and shales mostly represent the lower basin, while the headwaters of the main tributaries rise between very complex groups of igneous and metamorphic rocks (Government of Pakistan 1998; Salim & Khan 1973; Yousafzai et al. 2010).

Figure 5: Geological Map of Peshawar District



Source: Geology and Tectonics of Pakistan by A.H.Kazmi· and M. Qasim Jan, 1997

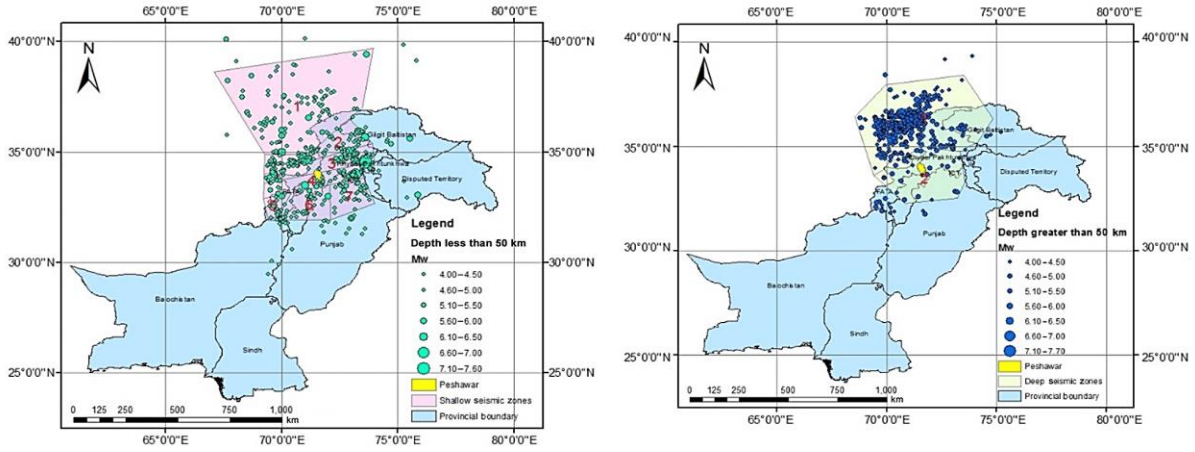
[9] Geology and Tectonics of Pakistan by A.H.Kazmi· and M.Qasimjan , 1997

4.2.5. Seismic Condition

A seismic hazard assessment must be considered for the Planning of a city at the broader as well as at the project level. Pakistan is situated at the junction of three tectonic plates, namely the Indian, Eurasian, and Arabian. Due to the continental plate drift of the Indian Plate and Asian Plate, Pakistan has suffered from devastating earthquakes in the past. The seismic zone map of Pakistan is shown below in figure 6.

According to MOHW-PEC-NEPAK (2007), Peshawar is placed in Zone 2B. Zone 2B has Peak Ground Acceleration (PGA) in the range of 0.16g to 0.24g for a return period of 475 years and is considered to be at a 'Moderate' risk of a major earthquake event.[10]

Figure 6: Seismic Hazard Map of Peshawar District[11]



(a) Shallow crustal earthquake (b) Deep subduction zone earthquake

Source: Mahmood, K., Ahmad, N., Khan, U., and Iqbal, Q.: Seismic hazard maps of Peshawar District for various return periods

Figure-6 presents the shallow and deep earthquake records, as well as the seismic zones as defined in BCP (2007). The figure provides information on the number of earthquakes in each seismic source, as well as the maximum and minimum magnitude of each source. It was observed that deep earthquakes were mostly concentrated in seismic source 1 and seismic source 2, which encompassed the Hindu Kush seismic region.

4.2.6. Hydrology

The Peshawar Valley is fed by four main rivers: the Kabul River, the Swat River, the Bara River, and the mighty Indus River. The Swat River originates in Kalam and flows southward! up to

[10] Khalid.M1, Ahmad.N, Khan.U, et al, Seismic hazard maps of Peshawar District for various return periods, Nat. Hazards Earth Syst. Sci., 20, 1639–1661, 2020 https://doi.org/10.5194/nhess-20-1639-2020

[11] Mahmood, K., Ahmad, N., Khan, U., and Iqbal, Q.: Seismic hazard maps of Peshawar District for various return periods, Nat. Hazards Earth Syst. Sci., 20, 1639–1661, https://doi.org/10.5194/nhess-20-1639-2020, 2020.

the place where it empties into the Kabul River. The Bara River originates in the Tirah Hills in the south and flows toward, the northeast up to the place where it joins the Kabul River that originates in the Wonay Pass, Afghanistan, and flows. west to east in the central part of the valley.

The Kabul River flows into the mighty Indus River (originating in Mansarwar, Tibet) in the east. The Indus River forms the eastern boundary, of the valley and flows from north to south (Government of Pakistan 1998; Salim & Khan 1973).

4.2.7. Surface Water

The surface water of Peshawar mainly comprises irrigation canals, rivers, ponds, dams, and non-perennial streams locally called *khwars*.

i. Canals

The Peshawar canal irrigation system was constructed in 1963-65 after the construction of the Warsak dam on the River Kabul including the pumping system for the lift canal. The canal system has 890 structures including 375 outlets. It has the following major canals:

a. Warsak lift feeder canal
b. Warsak lift canal with minor
c. Warsak gravity canal
d. Kabul river canal

Warsak gravity canal collects its supplies directly from the reservoir. It starts at the exit of 17081 feet tunnel through Mullagori Hills on the right side of the Kabul River having a discharge capacity of 550 cusecs upstream of Warsak Dam. The Warsak Gravity Canal is having a discharge capacity of 255 cusecs with a total length of 226,000 feet and was designed to irrigate an area of 58641 acres. Its designed irrigation intensity was 100%. To irrigate the area, 155 outlets have been taken off directly from the Warsak Gravity Canal while 59 outlets have been provided through 9 minors.

ii. Rivers

Peshawar consists of Bara, Shahalam, and Naguman rivers while the Kabul River only touches Jogni and Khatki UCs located in the North-West of the district. The Bara River enters the Peshawar district from Khyber Agency flows in the center of the city and finally, merged with Kabul in the Nowshera district. Shalam and Naguman rivers are the branches of the Kabul River which enter into the District with the Kabul River and flow toward the East.

iii. Non-perennial streams (*Khwar and Nullahs*)

Many non-perennial streams (*khwar and nullahs)* pass in the district jurisdiction from southern, western, and south-western parts and flow toward northern and eastern parts. All these *khwar and nullahs* discharge their water into the Bara River and Budni Nallah which is finally disposed into the Kabul River.

iv. Dams

Warsak is a major dam on River Kabul located on the North-West boarder of district Peshawar in the Mohmand tribal district (NMD) but the canals taken out of the dam mainly irrigate land in distract Peshawar. In the district Peshawar, there is only one small dam called Azakhel Dam located in the southern part of the district with a height of 23 meters (75 ft). This dam is used for both electricity generation and irrigation purposes.

4.2.8. Ground Water

The dominant aquifer system in Peshawar Valley is built up by a very heterogeneous alluvial fill of alternating layers of clay, silt, sand, and gravel. In the central part of the plain the depth of this layer is which is more than 250 m. In the vicinity of mountains surrounding the basin, hard rock aquifers are present.

In the northern part of the district the average depth of the groundwater table is 25 to 35 feet while in the northern part, it is below 300 feet. The City's water supply network entirely depends on the extraction of the groundwater and due to continuous discharge, the water table in the urban limit ranges from 160 feet to 300 feet. Because of the high water table in the northern part of the District, the hazard of salinization exists up to some extent. Peshawar valley has a unique drainage system, generally the groundwater flow towards the center of the basin from three different directions (north, south, and west) where the discharge is in the southeastern direction towards the Indus Valley.[12]

[12] Peshawar Land Use Plan by UPPU (2019)

4.3. Study Area Boundary Analysis

Under the Local Government Act 2013 (as amended in 2019) the Peshawar District has been divided into six tehsils and one Capital Metropolitan Government Peshawar (CMGP). The CMGP and six tehsils are further divided into 130 Neighbourhood Councils (NCs in the urban areas) and 227 Village Councils City (VCs- rural areas). The central part of Peshawar City consists of Peshawar Cantonment and administratively it is not part of the city, therefore, for the purpose of the current study, Peshawar Cantonment has been excluded, however, as Peshawar Cantonment is an integral part of Peshawar city the population of the area has been added to the overall population of the study area. The study area mainly consisting of CMG Peshawar area covering all 130 NCs and adjacent VCs both in the north and south of the CMG area that have the potential to become urban during the plan period (2022-2042). Total 77 VCs have been included in the study area. The total project area is **396.83** sq.km. The population of study area as per population of all NCs and VCs in 2017 turns out to be **2,868,714** people and this population has been used to assess need of different uses. The population and other details of the NCs & VCs of the study are given below in table below:

Table 2: Administrative Units & Population of the Peshawar Study Area

Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
1	Pishtkhara	Achini Bala	VC	12,780	1,672.51
2	Mathra	Shahi Payan	VC	13,747	2,202.07
3	Peshawar City	Haji Banda	VC	6,055	460.91
4	Peshawar City	Shaheen Town-I	NC	10,431	77.92
5	Peshawar City	Palosi Talarzai	NC	12,871	1,139.03
6	Peshawar City	Regi Yousafzai	VC	7,158	525.80
7	Peshawar City	Regi Aftezai	VC	7,220	785.15
8	Peshawar City	Palosi Maghdarzai	NC	11,731	660.56
9	Mathra	Haryana Payan	VC	4,744	1,640.27
10	Mathra	Kaniza	VC	8,063	132.81
11	Peshawar City	Dhaki Nalbandi	NC	16,321	90.58
12	Peshawar City	Shah Qabool	NC	3,146	30.69
13	Peshawar City	Temar Garhi	NC	15,980	19.00
14	Peshawar City	Sharif Abad	NC	15,491	31.21
15	Chamkani	Musazai	VC	19,152	2,012.98
16	Mathra	Main Mathra	VC	8,621	2,145.00
17	Peshawar City	Mughal Zai	NC	34,018	854.28
18	Peshawar City	Garhi Qamar Din	NC	29,182	662.55
19	Peshawar City	Peshawar Cantonment	Cantonment		3,557.90
20	Peshawar City	Sabaz Pir	NC	12,679	19.18
21	Peshawar City	Khan Mast Colony	NC	15,260	51.16
22	Peshawar City	Zargarabad-I	NC	12,624	22.27
23	Peshawar City	Zargarabad-II	NC	11,141	26.03
24	Peshawar City	Shabaz Town	NC	14,170	79.00
25	Peshawar City	Sheikh Abad-I	NC	13,137	60.98

Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
26	Peshawar City	Sheikh Abad-II	NC	11,382	20.17
27	Peshawar City	Sardar Gul Colony	NC	14,691	13.38
28	Peshawar City	Chishti Abad	NC	7,807	33.82
29	Peshawar City	Sikander Town	NC	14,363	127.47
30	Peshawar City	Imran Abad	NC	16,586	38.77
31	Peshawar City	Rahim Abad	NC	11,382	20.86
32	Peshawar City	Saeed Abad	NC	13,064	22.12
33	Peshawar City	Shaheen Muslim Town-I	NC	19,874	36.25
34	Peshawar City	Nodeh Payan	NC	14,750	156.71
35	Peshawar City	Afridi Abad	NC	20,382	150.70
36	Peshawar City	Asia-II	NC	13,150	32.23
37	Peshawar City	Mohmand Abad	NC	11,512	113.45
38	Peshawar City	Garib Abad	NC	13,301	164.38
39	Shah Alam	Essa Khel	VC	10,287	206.67
40	Peshawar City	MC Colony	NC	27,466	69.20
41	Peshawar City	Gul Abad	NC	13,471	116.63
42	Peshawar City	Achini Payan	NC	14,924	291.50
43	Peshawar City	Gorgatri	NC	14,658	40.72
44	Peshawar City	Asia-I	NC	15,998	34.42
45	Peshawar City	Asia-III	NC	9,931	27.85
46	Peshawar City	Wapda House	NC	11,843	163.91
47	Mathra	Gharii Fazle Haq	VC	5,465	328.82
48	Peshawar City	Miskeen Abad/ Rasheed Garhi	NC	11,865	57.65
49	Peshawar City	Wali Abad	NC	14,598	72.40
50	Peshawar City	Beri Bagh	NC	15,603	51.35
51	Peshawar City	Sheikh Amir Abad	NC	12,976	38.23
52	Mathra	Darmangi	VC	6,512	238.63
53	Peshawar City	Shad Bagh	NC	2,383	11.45
54	Peshawar City	Wazir Bagh	NC	9,445	54.84
55	Peshawar City	Akhoon Abad-II	NC	11,419	25.53
56	Peshawar City	Marvi Haa	NC	7,388	28.65
57	Peshawar City	New Kakshal/Wazir Abad	NC	13,581	38.63
58	Peshawar City	Abdara	NC	9,682	200.79
59	Peshawar City	Muslim Abad	NC	15,849	86.02
60	Pishtkhara	Noudeh Payan	VC	7,940	267.37
61	Pishtkhara	Khyber	NC	25,063	501.89
62	Peshawar City	Malkandher	NC	12,294	1,300.89
63	Pishtkhara	Umar Farooq	NC	36,209	1,209.03
64	Peshawar City	Industrial State	NC	13,972	900.02
65	Mathra	Hameed Abad Salar Qilla	VC	9,917	2,341.68
66	Peshawar City	Tatara	NC	15,659	719.13

Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
67	Mathra	Kafoor Dheri	VC	4,613	1,476.53
68	Mathra	Ghaljai Kandar Khel	VC	9,087	355.55
69	Mathra	Garhi Chandan	VC	10,444	1,381.02
70	Mathra	Garhi Sherdad	VC	9,917	661.69
71	Mathra	Ali Muhammad Banda	VC	10,581	1,556.01
72	Mathra	Kochyan	VC	5,325	428.14
73	Mathra	Panam Dheri	VC	5,583	2,119.40
74	Peshawar City	Nauthia Jadeed-II	NC	11,623	62.96
75	Mathra	Sufaid Sung-I	VC	13,437	1,057.72
76	Peshawar City	Regi Badezai	VC	5,744	205.26
77	Mathra	Shahi Bala	VC	25,434	1,807.36
78	Mathra	Bridge Nasir Khan	VC	6,064	867.46
79	Peshawar City	Regi Lalma	VC	6,706	1,084.34
80	Peshawar City	Regi Rukezai	VC	8,643	1,340.54
81	Peshawar City	Regi Lalma	NC	6,706	7,133.02
82	Peshawar City	Nauthia Jadeed-I	NC	16,430	72.23
83	Pishtkhara	Landi Bala	VC	9,494	470.66
84	Peshawar City	Dhora	NC	20,797	270.22
85	Pishtkhara	Sarband-II	VC	16,535	221.33
86	Peshawar City	Nodeh Bala	NC	40,811	857.04
87	Peshawar City	Lala Zar	NC	35,708	516.99
88	Pishtkhara	Sarband-III	VC	3,536	323.22
89	Peshawar City	Rahatabad-I	NC	18,965	189.70
90	Pishtkhara	Sarband-IV	VC	3,440	645.98
91	Peshawar City	Rameezi	NC	15,370	276.80
92	Peshawar City	Nawab Abad	NC	12,503	353.97
93	Peshawar City	Gharib Abad-1	NC	11,456	94.54
94	Peshawar City	Shaheen Town-II	NC	20,036	867.39
95	Peshawar City	Kandi Raza Khan	NC	6,500	100.67
96	Peshawar City	Palosi Atozai	NC	16,101	482.38
97	Peshawar City	Rahat Abad-II	NC	6,000	195.94
98	Peshawar City	Danishabad	NC	17,145	816.02
99	Peshawar City	Arbaban	NC	17,959	211.20
100	Peshawar City	Daud Zai	NC	18,093	404.63
101	Peshawar City	Charanda	NC	21,343	333.79
102	Shah Alam	Pajaggi	VC	8,777	139.16
103	Peshawar City	Kandi Hasanzai	NC	17,336	330.29
104	Peshawar City	Behari Colony	NC	14,011	368.45
105	Peshawar City	Babu Garhi	NC	29,505	1,268.76
106	Peshawar City	Mandozai	NC	15,656	332.92
107	Peshawar City	Landi Arbab-I	NC	17,367	125.01
108	Peshawar City	Rashid Garhi-II	NC	15,491	47.51
109	Mathra	Charpariza	VC	8,265	458.11
110	Mathra	Daag	VC	9,076	504.50

Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
111	Shah Alam	Faqir Garhi Fazil-II	VC	15,394	75.63
112	Shah Alam	Muslim Abad	VC	7,165	232.00
113	Mathra	Pir Bala	VC	8,241	510.58
114	Shah Alam	Nasapa Payan	VC	10,158	214.48
115	Mathra	Haryana Bala	VC	19,796	990.32
116	Shah Alam	Kukar	VC	16,158	244.33
117	Shah Alam	Samar Bagh	VC	11,660	706.85
118	Mathra	Terai Payan	VC	6,022	319.11
119	Chamkani	Hargoni	VC	5,176	480.61
120	Mathra	Putwar Payan	VC	6,011	1,541.02
121	Mathra	Mulazai	VC	17,997	1,146.82
122	Mathra	Lakari Kaniza	VC	6,845	223.80
123	Mathra	Choli	VC	10,713	867.38
124	Mathra	Terai Bala	VC	5,071	311.96
125	Shah Alam	Maqsood Abad	VC	17,380	380.32
126	Shah Alam	Faqir Garhi Fazil-I	VC	15,394	379.96
127	Shah Alam	Mandra Khel	VC	6,151	515.40
128	Shah Alam	Ahadi Pura	VC	12,016	166.54
129	Peshawar City	Hassan Garhi	NC	10,062	117.08
130	Shah Alam	Larama-II	VC	16,718	134.10
131	Peshawar City	Shagi Hindkiyan-I	VC	10,431	209.05
132	Peshawar City	Shagi Hindkiyan-II	VC	8,241	923.98
133	Peshawar City	Samdo Garhi	NC	15,456	94.60
134	Chamkani	Garhi Baloch	VC	6,638	449.75
135	Shah Alam	Larama-I	VC	18,246	232.73
136	Peshawar City	Din Bahar	NC	18,070	154.58
137	Shah Alam	Habib Abad	NC	18,246	316.58
138	Shah Alam	Ibrahim Abad	NC	14,222	254.45
139	Shah Alam	Tauheed Abad	VC	13,357	112.78
140	Chamkani	Muhammadia	VC	11,074	394.32
141	Chamkani	Siddique Akbar	VC	13,347	131.05
142	Peshawar City	Ittehad Colony	NC	6,402	49.99
143	Peshawar City	Saeed Abad	NC	13,064	167.60
144	Peshawar City	Yousaf Abad	NC	16,891	36.56
145	Peshawar City	Kishwar Abad	NC	16,904	341.96
146	Chamkani	Qazi Kallay	NC	42,627	192.20
147	Peshawar City	Afghan Colony	NC	18,753	138.43
148	Peshawar City	Garhi Rajkol	NC	26,448	229.53
149	Chamkani	Wazir Colony	NC	20,864	162.95
150	Chamkani	Latif Abad	NC	23,053	108.02
151	Peshawar City	Faqir Abad	NC	13,064	156.12
152	Peshawar City	Abaseen	NC	13,794	59.91
153	Chamkani	Pahari Pura	NC	27,426	292.68
154	Chamkani	Sirbiland Pura	NC	30,105	256.26

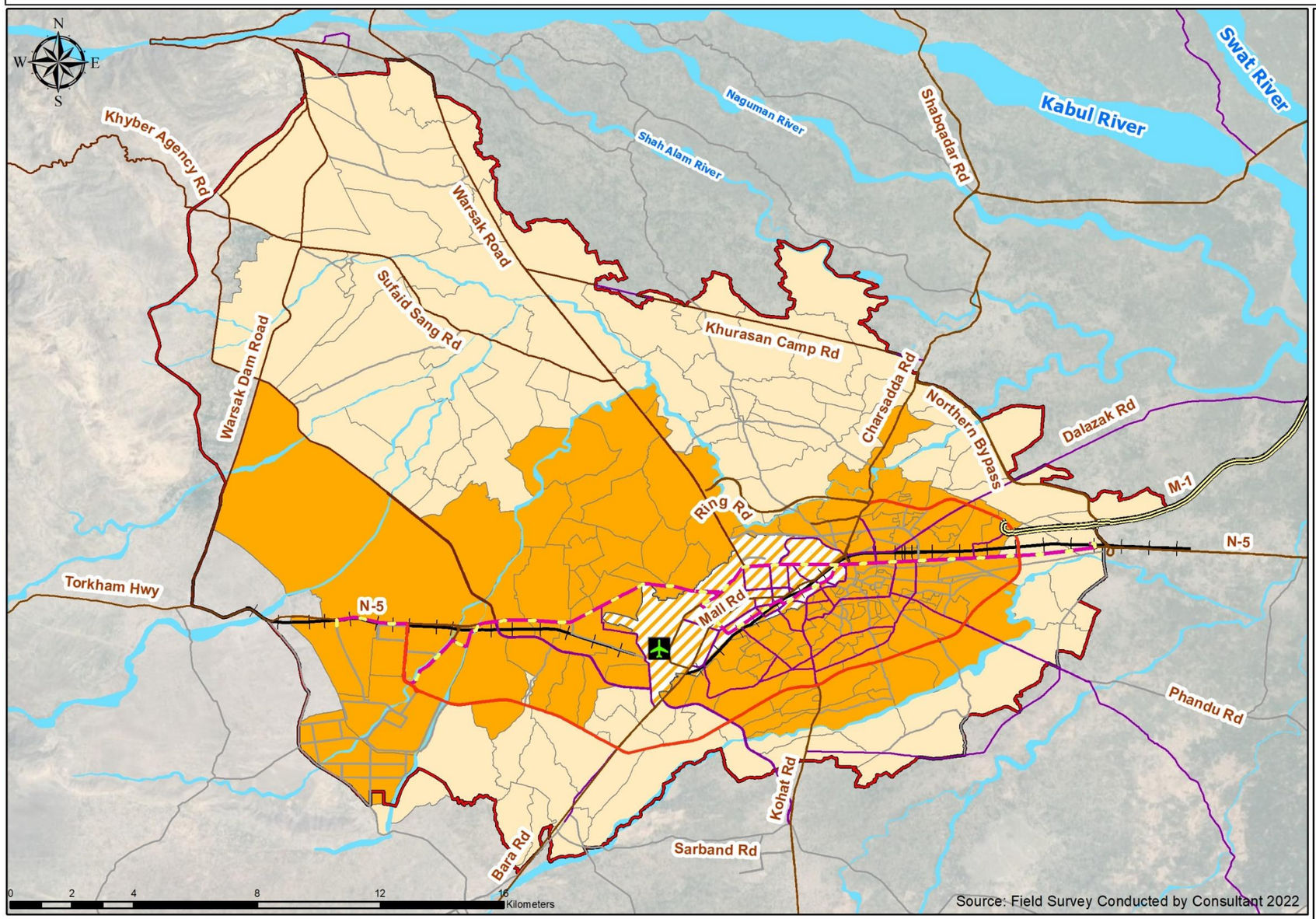
Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
155	Chamkani	Chughal Pura	VC	16,541	531.26
156	Chamkani	Sardar Garhi	VC	11,226	352.00
157	Peshawar City	Qadir Abad	NC	16,246	167.68
158	Peshawar City	Gul Bahar-II	NC	19,356	73.12
159	Peshawar City	Rasheed Town	NC	19,356	77.27
160	Peshawar City	Shaheen Muslim Town-II	NC	17,845	99.37
161	Chamkani	New Qadah Khel	VC	3,622	539.47
162	Peshawar City	Gul Bahar-I	NC	14,363	79.60
163	Chamkani	Umar Abad	VC	2,383	437.24
164	Peshawar City	Hussain Abad	NC	10,382	56.65
165	Chamkani	Phandu Payan	VC	15,534	434.65
166	Peshawar City	Pir Gulab Shah	NC	14,250	39.83
167	Peshawar City	Gul Bahar-IV	NC	16,627	681.25
168	Chamkani	Afridi Garhi	NC	9,716	187.56
169	Peshawar City	Molvi Abdul Hakeem	NC	14,250	16.14
170	Peshawar City	Shah Masoom	NC	12,679	32.40
171	Peshawar City	Chowk Nasir Khan	NC	13,454	51.22
172	Peshawar City	Ghanta Ghar	NC	10,621	31.89
173	Peshawar City	Gul Badshah Jee	NC	16,321	39.51
174	Pishtkhara	Wali Abad	VC	11,418	215.09
175	Peshawar City	Basti Pawaka	NC	13,675	403.73
176	Pishtkhara	Shaheed Abad	VC	8,373	159.53
177	Pishtkhara	Garhi Sikander Khan	VC	15,197	189.81
178	Pishtkhara	Pishtakhara Bala	VC	12,195	1,115.84
179	Pishtkhara	Pishtakhara Payan	VC	12,075	407.07
180	Peshawar City	Nauthia Qadeem-II	NC	11,561	39.76
181	Pishtkhara	Landi Akhoon Ahmad	VC	13,424	1,047.82
182	Peshawar City	Civil Quarter	NC	7,400	64.31
183	Peshawar City	Charkhana	NC	31,720	379.17
184	Peshawar City	Muhalla Kander	NC	15,980	81.95
185	Peshawar City	Gul Berg	NC	26,131	156.61
186	Peshawar City	Nauthia Qadeem-I	NC	12,959	76.87
187	Peshawar City	Kotla Mohsin Khan	NC	18,132	98.61
188	Peshawar City	Dheri Baghbanan	NC	20,520	97.10
189	Peshawar City	Qaid Abad	NC	17,555	83.89
190	Peshawar City	Landi Arbab-II	NC	19,518	446.72
191	Peshawar City	Lala Rukh Colony	NC	20,520	101.12
192	Peshawar City	Rashid Garhi-I	NC	14,894	106.56
193	Peshawar City	Gharib Abad-II	NC	10,784	686.30
194	Peshawar City	Sadozai	NC	28,813	492.37
195	Peshawar City	Achar-I	NC	15,966	252.68
196	Peshawar City	Marozai	VC	12,135	576.57
197	Pishtkhara	Shceme Chowk	VC	12,663	516.00
198	Pishtkhara	Ahmad Khel	VC	10,739	380.79

Sr. No	Tehsil Name	NC VC Name	Type	Population 2017	Area (Acres)
199	Mathra	Sufaid Sung-II	VC	11,164	66.03
200	Mathra	Lakarai	NC	6,304	454.93
201	Peshawar City	Bahadar Kalay	NC	12,766	233.63
202	Peshawar City	Baqir Shah	NC	9,586	30.17
203	Mathra	Patwar Bala Budha	VC	5,003	1,092.80
204	Pishtkhara	Abu Bakar Saddique	NC	7,493	1,179.19
205	Peshawar City	Akhoon Abad-I	NC	11,518	58.46
206	Peshawar City	Achar-II	NC	11,518	253.19
207	Peshawar City	Nawaz Abad	NC	13,794	54.75
208	Chamkani	Duran Pur	VC	11,621	68.89
	Total Population 2017			**2,868,714**	**92,751.26**

Source: Population Census (2017) and LGE & RDD Peshawar, 2022

Map 2: Administrative Boundaries of Peshawar Study Area

Administrative Boundaries



Legend

- Airport
- Motorway M1
- Ring Road
- BRT-Route
- Primary Road
- Secondary Road
- Tertiary Road
- Railway Line
- Project Area
- Waterbodies

NCVC's

- Cantonment
- Neighbourhood Councils (130 No's)
- Village Councils (77 No's)

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Developed by Consultant Secondary Data Collected from UPU Peshawar

4.3.1. Identification of Study Area as Urban & Peri-Urban

The Neighbourhood Councils of Peshawar, in accordance with the KP Land Use & Building Control Act of 2021, have been officially designated as an Urban Area. This recognition is based on the defined characteristics of urban development within the specified legal framework. The Neighbourhood Councils serve as focal points for concentrated urban activities and infrastructure.

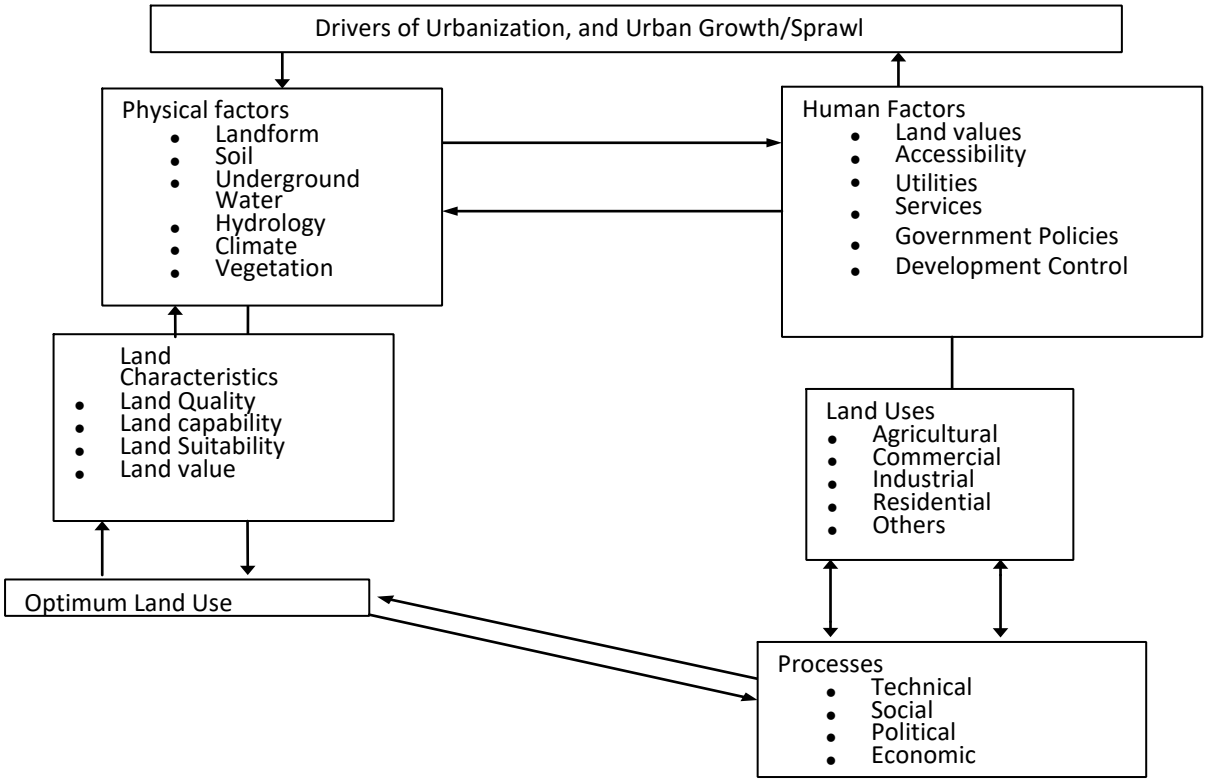
Furthermore, the Village Councils surrounding the Neighbourhood Councils are identified as the peri-urban area according to the same legislative framework. Peri-urban areas are described as the "area that spans the landscape between contiguous urban development and rural countryside with low population density and is predominantly being used for agriculture activity and is likely to be urbanised in the next twenty years as demarcated in the district land use plan".

Conversely, the regions beyond both the Neighbourhood Councils and their surrounding Village Councils fall within the rural classification. This demarcation is based on the criteria specified in the KP Land Use & Building Control Act of 2021, which distinguishes rural areas from their more developed urban and peri-urban counterparts. This classification system aligns with the evolving nature of Peshawar's landscape, recognizing the distinct characteristics of urban, peri-urban, and rural areas, as outlined in the regional land use plan. This framework not only aids in effective governance and planning but also sets the stage for sustainable development in the years to come.

4.3.2. Urban Growth Trend of Peshawar

Urban growth/sprawl is caused by many factors both physical and human. Together they influence the use of land for different purposes like agricultural, commercial, industrial and residential leading to spatial growth or sprawl. The usefulness of the land for a particular purpose may be assessed by its suitability, capability and value (FAO, 1976). Suitability refers to one tightly defined use or practice (McRae, 1981). Land capability refers to a range of uses for which land is suitable. The concept of value refers to cost of land that has monetary basis. The end product of these factors is the optimum land use (McRae, 1981). In the development of suitability and capability, technical data or classification is used. Socio-economic factors and processes also have a significant role to play in optimum use of land. Some political and economic factors are also extremely important in deciding the optimum purpose for which the land is used. These factors in turn decide the basis of existing land use ***(Figure. 07).***

Figure 7: Factors Affecting Urban Growth/Sprawl



Source: Devised by Consultant Using Various Research Papers[13]

The pattern of spatial urban growth in the provincial capital has been greatly influenced by three driving factors. However, it is not possible to quantify these driving factors of urban growth, therefore, an overarching picture of their impacts on Peshawar is given as follows:

- **Population Growth;** Peshawar is the fastest growing city of both Pakistan and Khyber Pakhtunkhwa. Being the provincial capital, it is hub of the financial and administrative functions of the province. Peshawar is one of the oldest and fastest growing cities of the country. The population growth rate of the city during the 1972-81 inter censual period was 4.69% (GoP, 1983) which was higher than the average growth rate of 4.38% for Pakistan and 3.89% for the province. The growth rate between 1981 and 1998 was 3.30%, again higher than Pakistan (2.61%) and the province (2.75%) (GoP, 2000). After 1980 the migration of Afghan refugees resulted in an all-time increase in the growth rate of the city and by 1998 the population had reached 2.01 million (excluding Afghan refugees) (GoP, 2000) while 0.97 million people were living within the urban limits. As per the Pakistan Bureau of Statistics census 2017, the population of Peshawar city was

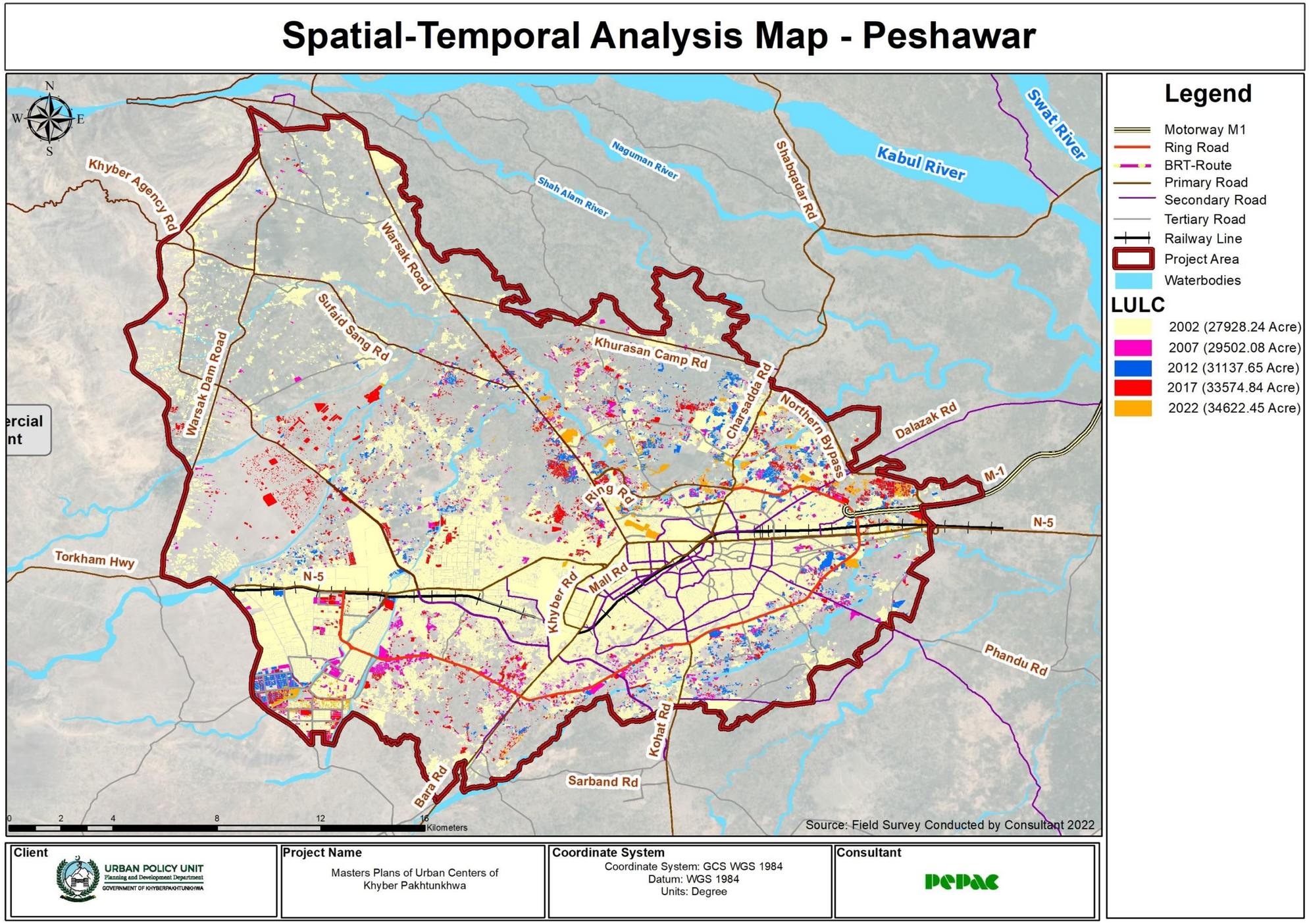
[13] Brueckner, J. K. (1987). The structure of urban equilibria: A unified treatment of the muth-mills model. Handbook of Regional and Urban Economics, 2, 821-845.
Muth, R. F. (1969). Cities and housing: The spatial pattern of urban residential land use. University of Chicago Press.
Simon, D. H., & Nardinelli, C. (2002). The economics of urban sprawl: Theory and evidence on the spatial sizes of cities. The B.E. Journal of Economic Analysis & Policy, 1(1).
McRae, J. F. (1981). The application of a regional land capability classification to agricultural land use planning in Manitoba, Canada. Soil Use and Management, 7(1), 2-7.

1.969 million, this means doubling of the population from 1998 to 2017. The current estimated population of Peshawar is 3 million and will reach above 4 million at the end of the plan period (2022 to 2042).

- **In-Migration Rate;** High in-migration is another important driver of excessive high urbanization in the Peshawar city. Due to many push and pull factors like natural disastrous (2005 earthquake and 2010 floods), political uncertainty in the Erstwhile Merged Districts and Malakand Division and Afghanistan the people were compelled to leave their place of origin and the likely destination of those in-migrants was Peshawar city. It has been estimated that Peshawar district has the highest migration rate among all the districts of Khyber Pakhtunkhwa going up to a whopping 12.37% in which intra-migration rate is 11.51% and inter-migration rate is 0.86%.[14] This high migration rate is bringing people from other districts within KP and from neighboring international border of Afghanistan to Peshawar in search of better economic opportunities and living standards.
- **Growth Poles;** Under the LGO 2001, Peshawar was designated as a City District, consists of four Towns and a cantonment. Later on, under the Local Government Act 2013 (as amended in 2019) the Peshawar District has been divided into six towns and one Capital Metropolitan Government (CMG). Currently Peshawar is sprawling in all direction, but the sprawl is very rapid towards north, and northeast (UPU 2020). The major factor for this high spatial growth is the investment in the real estate sector by both public and private sector like the development of Hayatabad township and Regi Lalma modal Town by PDA and development of a major housing scheme by Defense Housing Authority opposite to RMT. Sheikh Yaseen Town, Sabzali town and many other housing schemes developed by private investors in these areas worked a strong growth pole to attract spatial growth to the western and northern part of the city. The commercial areas along the ring road in the southern side and two industrial estates (one located in Hayatabad and the other on Kohat Road) were the two major growth poles that caused the city to grow in the southern, south-eastern and south-western side.

[14] Pakistan Social and Living Standards Measurement Survey 2019-20, PBS.

Map 3: Spatial Temporal Analysis of Peshawar Study Area



Source: Devised by Consultants

4.4. Population Density

Population density is defined as number of people residing per unit of area. In a general sense, it tells how many people would live within one-unit area if the population was to be evenly distributed across the area. However, the reality is far from that because population is not evenly distributed across space. People in urban areas tend to live in close proximity and there are more people living in per unit area while in rural areas, people are spread out across a much more sparsely populated landscape. Density levels even vary quite a bit from city to city, and even across different neighbourhoods within a single city.

4.4.1. Standard of High, Medium and Low Density

Since every city and country have different populations and areas, each will have a distinct population density. There is no one scale fit all criteria to define population density. However, population density has been divided into three classes i.e., low, medium, and high based on the criteria given in KP Urban Policy 2022, according to which medium density is defined as 20,000 persons per square kilometre or 200 people per hectare. Therefore, low density refers to minimum number of people living in per unit area which is being 100-200 people per hectare, and high refers to maximum number of people living in per unit area which is being 301-400 people per hectare. This should be noted, however, that the criteria adopted in KP Urban Policy is solely based on distance from transit areas and it does not consider other socio-economic factors.

Table 3: Density Criteria Given in KP Urban Policy

Density Zone	Distance from Transit	Average Population Density
Mixed Use with High Density Residential (CBD)	< 400 metres	301-400 PPH
Mixed Use with Medium Density Residential	400 – 800 metres	201-300 PPH
Low Density Residential	> 800 metres	100 to 200 PPH

Source: KP Urban Policy, 2022 to 2030

New York city has population density of 10,852 per km^2, Delhi has population density of 10,000 per km^2, Lahore has population density of 6,300 per km^2 and Murree has population density of 539 per km^2.

4.4.2. Existing and Current Population Density of Peshawar by NC/VC

The population density of Urban Peshawar's administrative units has shown a noticeable shift between 2017 and 2022, reflecting urban growth and changing settlement patterns across Neighborhood Councils (NCs) and Village Councils (VCs). In 2017, the majority of NCs fell into the low-density category, with 45 out of the total classified as having a density of fewer than 200 persons per hectare (PPH). Only 17 NCs were categorized as medium density, and a significant 68 NCs were identified as high-density areas, with more than 300 PPH.

By 2022, the number of high-density NCs increased to 78, indicating intensified urbanization and population concentration in certain areas. Meanwhile, the medium-density NCs slightly

decreased to 5, and low-density NCs also dropped to 40, suggesting a general upward shift in population density across Urban Peshawar.

A similar trend is observed in the VCs, though on a smaller scale. In 2017, most VCs were low-density, with 72 falling under this category, while only 4 were classified as high-density, and 2 as medium-density. By 2022, there is a rise in high-density VCs, increasing to 6, while medium-density VCs grew to 5, and low-density VCs decreased to 66.

Table 4: Existing and Current Population Density of Each Administrative Unit and Its Categorisation – Urban Peshawar

Administrative Unit	Density Range			
	Year	High Density (>300 PPH)	Medium Density (201-300 PPH)	Low Density (<200 PPH)
No. of NCs	2017	68	17	45
	2022	78	12	40
No. of VCs	2017	4	2	72
	2022	6	5	66

Source: Population Census, 2017, LGE & RDD computed by PEPAC and Associates

Table 5: Existing and Current Population Density by NC and VC for 2017 and 2022 - Peshawar Study Area

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
1	Achini Bala	VC	12,780	676.84	18.88	Low	23.50	Low
2	Shahi Payan	VC	13,747	891.15	15.43	Low	19.20	Low
3	Haji Banda	VC	6,055	186.52	32.46	Low	40.41	Low
4	Shaheen Town-I	NC	10,431	31.53	330.80	High	411.79	High
5	Palosi Talarzai	NC	12,871	460.95	27.92	Low	34.76	Low
6	Regi Yousafzai	VC	7,158	212.78	33.64	Low	41.88	Low
7	Regi Aftezai	VC	7,220	317.74	22.72	Low	28.29	Low
8	Palosi Maghdarzai	NC	11,731	267.32	43.88	Low	54.63	Low
9	Haryana Payan	VC	4,744	663.79	7.15	Low	8.90	Low
10	Kaniza	VC	8,063	53.75	150.02	Low	186.75	Low
11	Dhaki Nalbandi	NC	16,321	36.65	445.27	High	554.28	High
12	Shah Qabool	NC	3,146	12.42	253.26	Medium	315.27	High
13	Temar Garhi	NC	15,980	7.69	2078.65	High	2587.57	High
14	Sharif Abad	NC	15,491	12.63	1226.39	High	1526.65	High
15	Musazai	VC	19,152	814.63	23.51	Low	29.27	Low
16	Main Mathra	VC	8,621	868.05	9.93	Low	12.36	Low
17	Mughal Zai	NC	34,018	345.72	98.40	Low	122.49	Low
18	Garhi Qamar Din	NC	29,182	268.13	108.84	Low	135.48	Low
19	Peshawar Cantonment	Cantonment		1439.83	-	-	-	-
20	Sabaz Pir	NC	12,679	7.76	1633.09	High	2032.92	High
21	Khan Mast Colony	NC	15,260	20.70	737.03	High	917.48	High
22	Zargarabad-I	NC	12,624	9.01	1400.96	High	1743.96	High
23	Zargarabad-II	NC	11,141	10.53	1057.57	High	1316.50	High
24	Shabaz Town	NC	14,170	31.97	443.23	High	551.75	High
25	Sheikh Abad-I	NC	13,137	24.68	532.31	High	662.64	High
26	Sheikh Abad-II	NC	11,382	8.16	1394.35	High	1735.73	High

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
27	Sardar Gul Colony	NC	14,691	5.41	2713.65	High	3378.04	High
28	Chishti Abad	NC	7,807	13.69	570.48	High	710.15	High
29	Sikander Town	NC	14,363	51.59	278.43	Medium	346.60	High
30	Imran Abad	NC	16,586	15.69	1057.06	High	1315.86	High
31	Rahim Abad	NC	11,382	8.44	1348.31	High	1678.41	High
32	Saeed Abad	NC	13,064	8.95	1459.50	High	1816.83	High
33	Shaheen Muslim Town-I	NC	19,874	14.67	1354.84	High	1686.55	High
34	Nodeh Payan	NC	14,750	63.42	232.59	Medium	289.53	Medium
35	Afridi Abad	NC	20,382	60.99	334.21	High	416.04	High
36	Asia-II	NC	13,150	13.04	1008.16	High	1254.98	High
37	Mohmand Abad	NC	11,512	45.91	250.74	Medium	312.13	High
38	Garib Abad	NC	13,301	66.52	199.95	Low	248.91	Medium
39	Essa Khel	VC	10,287	83.64	122.99	Low	153.11	Low
40	MC Colony	NC	27,466	28.01	980.72	High	1220.84	High
41	Gul Abad	NC	13,471	47.20	285.41	Medium	355.28	High
42	Achini Payan	NC	14,924	117.97	126.51	Low	157.49	Low
43	Gorgatri	NC	14,658	16.48	889.57	High	1107.37	High
44	Asia-I	NC	15,998	13.93	1148.61	High	1429.83	High
45	Asia-III	NC	9,931	11.27	881.08	High	1096.80	High
46	Wapda House	NC	11,843	66.33	178.55	Low	222.26	Medium
47	Gharii Fazle Haq	VC	5,465	133.07	41.07	Low	51.12	Low
48	Miskeen Abad/ Rasheed Garhi	NC	11,865	23.33	508.58	High	633.09	High
49	Wali Abad	NC	14,598	29.30	498.21	High	620.19	High
50	Beri Bagh	NC	15,603	20.78	750.87	High	934.71	High
51	Sheikh Amir Abad	NC	12,976	15.47	838.79	High	1044.15	High
52	Darmangi	VC	6,512	96.57	67.43	Low	83.94	Low

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
53	Shad Bagh	NC	2,383	4.63	514.30	High	640.21	High
54	Wazir Bagh	NC	9,445	22.19	425.62	High	529.82	High
55	Akhoon Abad-II	NC	11,419	10.33	1105.24	High	1375.83	High
56	Marvi Haa	NC	7,388	11.60	637.15	High	793.15	High
57	New Kakshal/Wazir Abad	NC	13,581	15.63	868.83	High	1081.55	High
58	Abdara	NC	9,682	81.26	119.15	Low	148.32	Low
59	Muslim Abad	NC	15,849	34.81	455.28	High	566.75	High
60	Noudeh Payan	VC	7,940	108.20	73.38	Low	91.35	Low
61	Khyber	NC	25,063	203.11	123.40	Low	153.61	Low
62	Malkandher	NC	12,294	526.45	23.35	Low	29.07	Low
63	Umar Farooq	NC	36,209	489.28	74.01	Low	92.12	Low
64	Industrial State	NC	13,972	364.22	38.36	Low	47.75	Low
65	Hameed Abad Salar Qilla	VC	9,917	947.65	10.46	Low	13.03	Low
66	Tatara	NC	15,659	291.02	53.81	Low	66.98	Low
67	Kafoor Dheri	VC	4,613	597.53	7.72	Low	9.61	Low
68	Ghaljai Kandar Khel	VC	9,087	143.89	63.15	Low	78.62	Low
69	Garhi Chandan	VC	10,444	558.88	18.69	Low	23.26	Low
70	Garhi Sherdad	VC	9,917	267.78	37.03	Low	46.10	Low
71	Ali Muhammad Banda	VC	10,581	629.70	16.80	Low	20.92	Low
72	Kochyan	VC	5,325	173.26	30.73	Low	38.26	Low
73	Panam Dheri	VC	5,583	857.69	6.51	Low	8.10	Low
74	Nauthia Jadeed-II	NC	11,623	25.48	456.21	High	567.91	High
75	Sufaid Sung-I	VC	13,437	428.04	31.39	Low	39.08	Low
76	Regi Badezai	VC	5,744	83.07	69.15	Low	86.08	Low
77	Shahi Bala	VC	25,434	731.41	34.77	Low	43.29	Low

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
78	Bridge Nasir Khan	VC	6,064	351.05	17.27	Low	21.50	Low
79	Regi Lalma	VC	6,706	438.82	15.28	Low	19.02	Low
80	Regi Rukezai	VC	8,643	542.50	15.93	Low	19.83	Low
81	Regi Lalma	NC	6,706	2886.63	2.32	Low	2.89	Low
82	Nauthia Jadeed-I	NC	16,430	29.23	562.07	High	699.68	High
83	Landi Bala	VC	9,494	190.47	49.85	Low	62.05	Low
84	Dhora	NC	20,797	109.35	190.18	Low	236.74	Medium
85	Sarband-II	VC	16,535	89.57	184.61	Low	229.81	Medium
86	Nodeh Bala	NC	40,811	346.83	117.67	Low	146.48	Low
87	Lala Zar	NC	35,708	209.22	170.67	Low	212.46	Medium
88	Sarband-III	VC	3,536	130.80	27.03	Low	33.65	Low
89	Rahatabad-I	NC	18,965	76.77	247.04	Medium	307.52	High
90	Sarband-IV	VC	3,440	261.42	13.16	Low	16.38	Low
91	Rameezi	NC	15,370	112.02	137.21	Low	170.81	Low
92	Nawab Abad	NC	12,503	143.25	87.28	Low	108.65	Low
93	Gharib Abad-1	NC	11,456	38.26	299.43	Medium	372.74	High
94	Shaheen Town-II	NC	20,036	351.02	57.08	Low	71.05	Low
95	Kandi Raza Khan	NC	6,500	40.74	159.55	Low	198.61	Low
96	Palosi Atozai	NC	16,101	195.21	82.48	Low	102.67	Low
97	Rahat Abad-II	NC	6,000	79.29	75.67	Low	94.19	Low
98	Danishabad	NC	17,145	330.23	51.92	Low	64.63	Low
99	Arbaban	NC	17,959	85.47	210.12	Medium	261.56	Medium
100	Daud Zai	NC	18,093	163.75	110.49	Low	137.54	Low
101	Charanda	NC	21,343	135.08	158.00	Low	196.69	Low
102	Pajaggi	VC	8,777	56.32	155.85	Low	194.01	Low
103	Kandi Hasanzai	NC	17,336	133.66	129.70	Low	161.45	Low
104	Behari Colony	NC	14,011	149.11	93.97	Low	116.97	Low
105	Babu Garhi	NC	29,505	513.45	57.46	Low	71.53	Low

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
106	Mandozai	NC	15,656	134.73	116.20	Low	144.65	Low
107	Landi Arbab-I	NC	17,367	50.59	343.30	High	427.35	High
108	Rashid Garhi-II	NC	15,491	19.23	805.65	High	1002.90	High
109	Charpariza	VC	8,265	185.39	44.58	Low	55.50	Low
110	Daag	VC	9,076	204.16	44.45	Low	55.34	Low
111	Faqir Garhi Fazil-II	VC	15,394	30.61	502.96	High	626.10	High
112	Muslim Abad	VC	7,165	93.89	76.31	Low	95.00	Low
113	Pir Bala	VC	8,241	206.63	39.88	Low	49.65	Low
114	Nasapa Payan	VC	10,158	86.80	117.03	Low	145.69	Low
115	Haryana Bala	VC	19,796	400.77	49.40	Low	61.49	Low
116	Kukar	VC	16,158	98.88	163.42	Low	203.43	Medium
117	Samar Bagh	VC	11,660	286.05	40.76	Low	50.74	Low
118	Terai Payan	VC	6,022	129.14	46.63	Low	58.05	Low
119	Hargoni	VC	5,176	194.50	26.61	Low	33.13	Low
120	Putwar Payan	VC	6,011	623.63	9.64	Low	12.00	Low
121	Mulazai	VC	17,997	464.10	38.78	Low	48.27	Low
122	Lakari Kaniza	VC	6,845	90.57	75.58	Low	94.08	Low
123	Choli	VC	10,713	351.02	30.52	Low	37.99	Low
124	Terai Bala	VC	5,071	126.25	40.17	Low	50.00	Low
125	Maqsood Abad	VC	17,380	153.91	112.92	Low	140.57	Low
126	Faqir Garhi Fazil-I	VC	15,394	153.76	100.11	Low	124.63	Low
127	Mandra Khel	VC	6,151	208.57	29.49	Low	36.71	Low
128	Ahadi Pura	VC	12,016	67.40	178.28	Low	221.93	Medium
129	Hassan Garhi	NC	10,062	47.38	212.36	Medium	264.35	Medium
130	Larama-II	VC	16,718	54.27	308.05	High	383.47	High
131	Shagi Hindkiyan-I	VC	10,431	84.60	123.30	Low	153.48	Low
132	Shagi Hindkiyan-II	VC	8,241	373.92	22.04	Low	27.44	Low
133	Samdo Garhi	NC	15,456	38.28	403.72	High	502.56	High

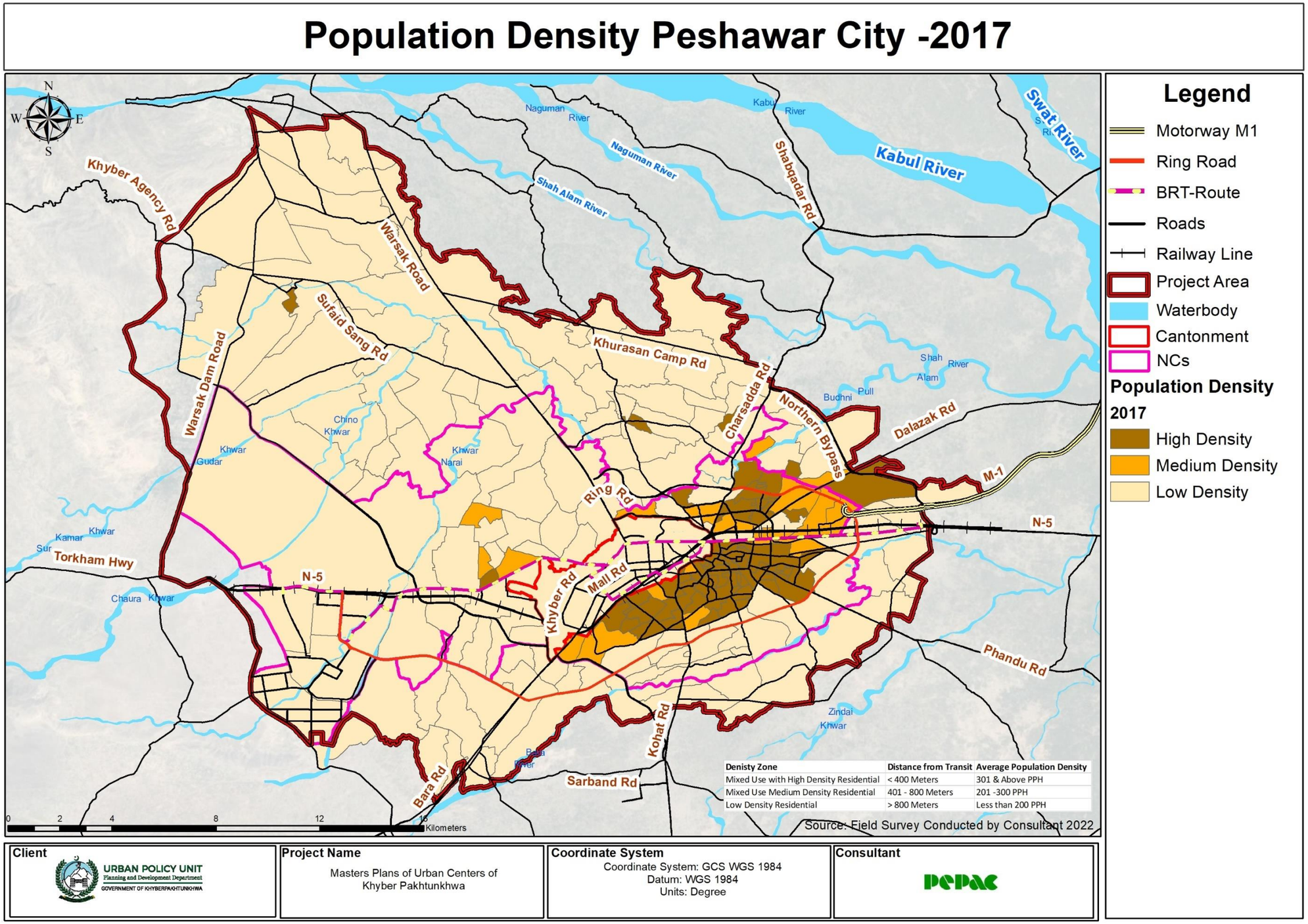
Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
134	Garhi Baloch	VC	6,638	182.01	36.47	Low	45.40	Low
135	Larama-I	VC	18,246	94.18	193.73	Low	241.16	Medium
136	Din Bahar	NC	18,070	62.56	288.86	Medium	359.58	High
137	Habib Abad	NC	18,246	128.12	142.42	Low	177.29	Low
138	Ibrahim Abad	NC	14,222	102.97	138.11	Low	171.93	Low
139	Tauheed Abad	VC	13,357	45.64	292.65	Medium	364.31	High
140	Muhammadia	VC	11,074	159.58	69.40	Low	86.39	Low
141	Siddique Akbar	VC	13,347	53.03	251.67	Medium	313.29	High
142	Ittehad Colony	NC	6,402	20.23	316.44	High	393.91	High
143	Saeed Abad	NC	13,064	67.83	192.61	Low	239.76	Medium
144	Yousaf Abad	NC	16,891	14.79	1141.73	High	1421.26	High
145	Kishwar Abad	NC	16,904	138.39	122.15	Low	152.06	Low
146	Qazi Kallay	NC	42,627	77.78	548.05	High	682.23	High
147	Afghan Colony	NC	18,753	56.02	334.76	High	416.72	High
148	Garhi Rajkol	NC	26,448	92.89	284.74	Medium	354.45	High
149	Wazir Colony	NC	20,864	65.94	316.39	High	393.85	High
150	Latif Abad	NC	23,053	43.72	527.34	High	656.46	High
151	Faqir Abad	NC	13,064	63.18	206.77	Medium	257.39	Medium
152	Abaseen	NC	13,794	24.24	568.97	High	708.27	High
153	Pahari Pura	NC	27,426	118.44	231.55	Medium	288.25	Medium
154	Sirbiland Pura	NC	30,105	103.70	290.30	Medium	361.37	High
155	Chughal Pura	VC	16,541	214.99	76.94	Low	95.77	Low
156	Sardar Garhi	VC	11,226	142.45	78.81	Low	98.10	Low
157	Qadir Abad	NC	16,246	67.86	239.41	Medium	298.02	Medium
158	Gul Bahar-II	NC	19,356	29.59	654.16	High	814.32	High
159	Rasheed Town	NC	19,356	31.27	618.96	High	770.50	High
160	Shaheen Muslim Town-II	NC	17,845	40.22	443.74	High	552.38	High

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
161	New Qadah Khel	VC	3,622	218.32	16.59	Low	20.65	Low
162	Gul Bahar-I	NC	14,363	32.21	445.89	High	555.06	High
163	Umar Abad	VC	2,383	176.95	13.47	Low	16.76	Low
164	Hussain Abad	NC	10,382	22.93	452.85	High	563.73	High
165	Phandu Payan	VC	15,534	175.90	88.31	Low	109.93	Low
166	Pir Gulab Shah	NC	14,250	16.12	884.01	High	1100.44	High
167	Gul Bahar-IV	NC	16,627	275.69	60.31	Low	75.08	Low
168	Afridi Garhi	NC	9,716	75.90	128.01	Low	159.35	Low
169	Molvi Abdul Hakeem	NC	14,250	6.53	2181.04	High	2715.03	High
170	Shah Masoom	NC	12,679	13.11	967.03	High	1203.80	High
171	Chowk Nasir Khan	NC	13,454	20.73	649.07	High	807.99	High
172	Ghanta Ghar	NC	10,621	12.90	823.11	High	1024.64	High
173	Gul Badshah Jee	NC	16,321	15.99	1020.79	High	1270.71	High
174	Wali Abad	VC	11,418	87.04	131.18	Low	163.29	Low
175	Basti Pawaka	NC	13,675	163.39	83.70	Low	104.19	Low
176	Shaheed Abad	VC	8,373	64.56	129.69	Low	161.44	Low
177	Garhi Sikander Khan	VC	15,197	76.81	197.85	Low	246.29	Medium
178	Pishtakhara Bala	VC	12,195	451.56	27.01	Low	33.62	Low
179	Pishtakhara Payan	VC	12,075	164.73	73.30	Low	91.25	Low
180	Nauthia Qadeem-II	NC	11,561	16.09	718.59	High	894.52	High
181	Landi Akhoon Ahmad	VC	13,424	424.04	31.66	Low	39.41	Low
182	Civil Quarter	NC	7,400	26.02	284.36	Medium	353.98	High
183	Charkhana	NC	31,720	153.44	206.72	Medium	257.33	Medium
184	Muhalla Kander	NC	15,980	33.17	481.82	High	599.79	High
185	Gul Berg	NC	26,131	63.38	412.29	High	513.23	High
186	Nauthia Qadeem-I	NC	12,959	31.11	416.55	High	518.54	High
187	Kotla Mohsin Khan	NC	18,132	39.91	454.38	High	565.63	High
188	Dheri Baghbanan	NC	20,520	39.30	522.19	High	650.04	High

Sr. No	NC VC Name	Type	Population 2017	Area (Hectares)	Density 2017 (PPH)	Density Scale	Density 2022 (PPH)	Density Scale
189	Qaid Abad	NC	17,555	33.95	517.07	High	643.66	High
190	Landi Arbab-II	NC	19,518	180.78	107.97	Low	134.40	Low
191	Lala Rukh Colony	NC	20,520	40.92	501.44	High	624.20	High
192	Rashid Garhi-I	NC	14,894	43.13	345.37	High	429.92	High
193	Gharib Abad-II	NC	10,784	277.73	38.83	Low	48.33	Low
194	Sadozai	NC	28,813	199.25	144.60	Low	180.01	Low
195	Achar-I	NC	15,966	102.26	156.14	Low	194.36	Low
196	Marozai	VC	12,135	233.33	52.01	Low	64.74	Low
197	Shceme Chowk	VC	12,663	208.82	60.64	Low	75.49	Low
198	Ahmad Khel	VC	10,739	154.10	69.69	Low	86.75	Low
199	Sufaid Sung-II	VC	11,164	26.72	417.82	High	520.12	High
200	Lakarai	NC	6,304	184.10	34.24	Low	42.63	Low
201	Bahadar Kalay	NC	12,766	94.55	135.03	Low	168.08	Low
202	Baqir Shah	NC	9,586	12.21	785.02	High	977.22	High
203	Patwar Bala Budha	VC	5,003	442.24	11.31	Low	14.08	Low
204	Abu Bakar Saddique	NC	7,493	477.20	15.70	Low	19.55	Low
205	Akhoon Abad-I	NC	11,518	23.66	486.83	High	606.02	High
206	Achar-II	NC	11,518	102.46	112.41	Low	139.93	Low
207	Nawaz Abad	NC	13,794	22.16	622.58	High	775.00	High
208	Duran Pur	VC	11,621	27.88	416.87	High	518.93	High

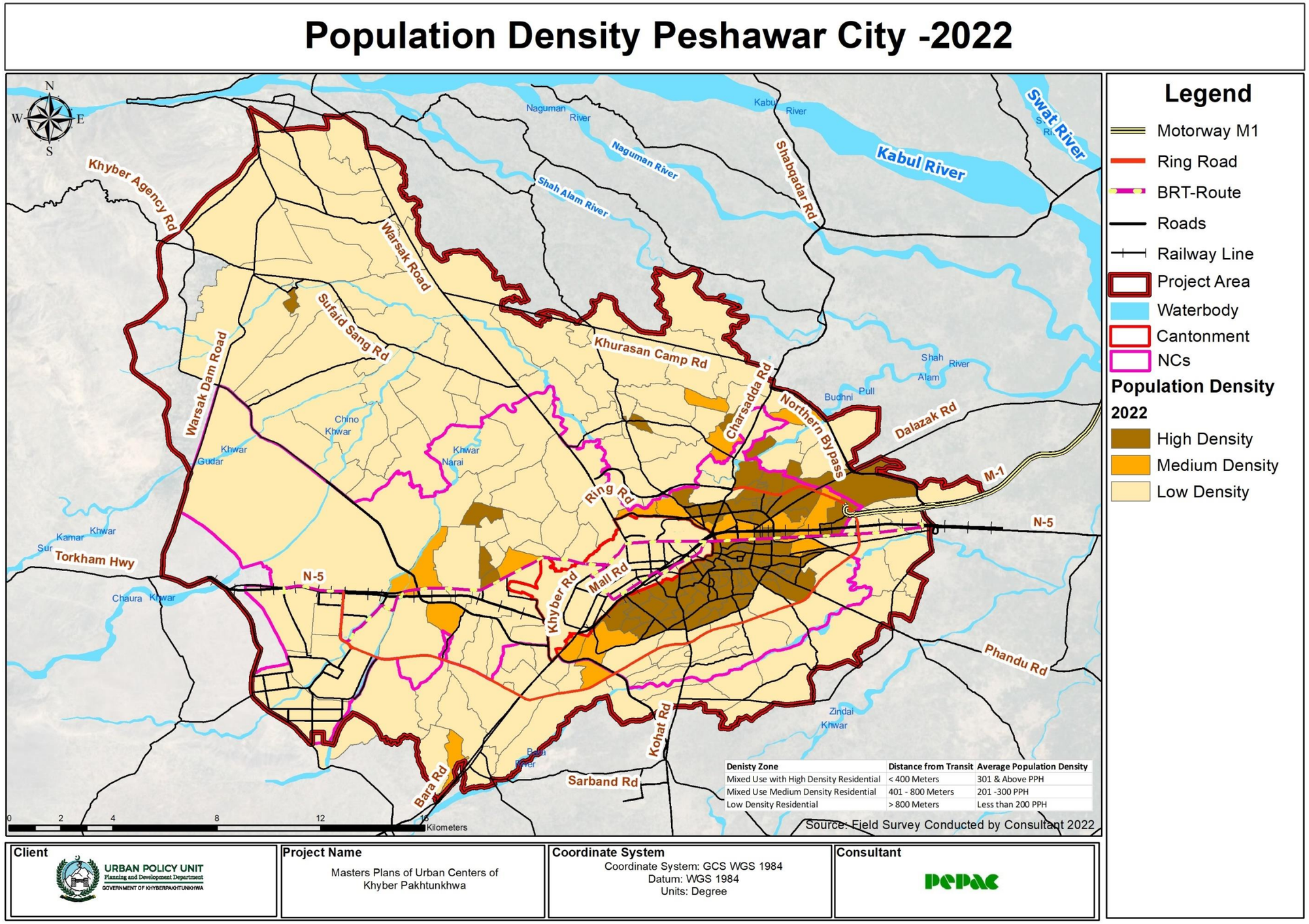
Source: Population Census, 2017, LGE & RDD computed by Consultants

Map 4: Existing Population density Map for 2017 – Peshawar Study Area



Source: Devised by Consultant

Map 5: Current Population density Map for 2022 – Peshawar Study Area



Source: Devised by Consultant

4.4.3. Projected Population Density for 2042

Based on the projected population for each Neighborhood Council (NC) and Village Council (VC) in Urban Peshawar, the anticipated population density for these administrative units has been calculated for the year 2042. The projections indicate that several NCs and VCs will transition from medium to high density by 2042, with notable increases expected in areas like Nodeh Payan NC, Garib Abad NC, and Lala Zar NC. Sardar Gul Colony NC is projected to have the highest density, reaching 6,926 persons per hectare (PPH) by 2042, while Panam Dheri VC is expected to maintain the lowest density at just 17 PPH. These findings illustrate significant variations in urban density across the region, with certain areas poised for more intensive development than others. The following table provides a detailed breakdown of the projected population density for each NC and VC by 2042;

Table 6: Projected Population Density by NC and VC for 2042 – Peshawar Study Area

Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
1	Achini Bala	VC	32,619	676.84	48.19	Low
2	Shahi Payan	VC	35,087	891.15	39.37	Low
3	Haji Banda	VC	15,454	186.52	82.85	Low
4	Shaheen Town-I	NC	26,623	31.53	844.30	High
5	Palosi Talarzai	NC	32,851	460.95	71.27	Low
6	Regi Yousafzai	VC	18,269	212.78	85.86	Low
7	Regi Aftezai	VC	18,428	317.74	58.00	Low
8	Palosi Maghdarzai	NC	29,941	267.32	112.01	Low
9	Haryana Payan	VC	12,108	663.79	18.24	Low
10	Kaniza	VC	20,579	53.75	382.89	High
11	Dhaki Nalbandi	NC	41,656	36.65	1136.46	High
12	Shah Qabool	NC	8,030	12.42	646.41	High
13	Temar Garhi	NC	40,786	7.69	5305.37	High
14	Sharif Abad	NC	39,538	12.63	3130.13	High
15	Musazai	VC	48,882	814.63	60.01	Low
16	Main Mathra	VC	22,003	868.05	25.35	Low
17	Mughal Zai	NC	86,825	345.72	251.14	Medium
18	Garhi Qamar Din	NC	74,482	268.13	277.79	Medium
19	Peshawar Cantonment	Cantonment	-	1439.83	0.00	Low
20	Sabaz Pir	NC	32,361	7.76	4168.16	High
21	Khan Mast Colony	NC	38,948	20.70	1881.14	High
22	Zargarabad-I	NC	32,220	9.01	3575.69	High
23	Zargarabad-II	NC	28,435	10.53	2699.26	High
24	Shabaz Town	NC	36,166	31.97	1131.27	High
25	Sheikh Abad-I	NC	33,530	24.68	1358.62	High
26	Sheikh Abad-II	NC	29,050	8.16	3558.82	High
27	Sardar Gul Colony	NC	37,496	5.41	6926.08	High
28	Chishti Abad	NC	19,926	13.69	1456.04	High

Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
29	Sikander Town	NC	36,659	51.59	710.64	High
30	Imran Abad	NC	42,333	15.69	2697.95	High
31	Rahim Abad	NC	29,050	8.44	3441.30	High
32	Saeed Abad	NC	33,343	8.95	3725.11	High
33	Shaheen Muslim Town-I	NC	50,725	14.67	3457.99	High
34	Nodeh Payan	NC	37,647	63.42	593.64	High
35	Afridi Abad	NC	52,021	60.99	853.01	High
36	Asia-II	NC	33,563	13.04	2573.13	High
37	Mohmand Abad	NC	29,382	45.91	639.97	High
38	Garib Abad	NC	33,948	66.52	510.34	High
39	Essa Khel	VC	26,256	83.64	313.92	High
40	MC Colony	NC	70,102	28.01	2503.11	High
41	Gul Abad	NC	34,382	47.20	728.44	High
42	Achini Payan	NC	38,091	117.97	322.90	High
43	Gorgatri	NC	37,412	16.48	2270.47	High
44	Asia-I	NC	40,832	13.93	2931.62	High
45	Asia-III	NC	25,347	11.27	2248.80	High
46	Wapda House	NC	30,227	66.33	455.71	High
47	Gharii Fazle Haq	VC	13,948	133.07	104.82	Low
48	Miskeen Abad/ Rasheed Garhi	NC	30,283	23.33	1298.05	High
49	Wali Abad	NC	37,259	29.30	1271.59	High
50	Beri Bagh	NC	39,824	20.78	1916.46	High
51	Sheikh Amir Abad	NC	33,119	15.47	2140.85	High
52	Darmangi	VC	16,621	96.57	172.11	Low
53	Shad Bagh	NC	6,082	4.63	1312.65	High
54	Wazir Bagh	NC	24,107	22.19	1086.31	High
55	Akhoon Abad-II	NC	29,145	10.33	2820.91	High
56	Marvi Haa	NC	18,856	11.60	1626.22	High
57	New Kakshal/Wazir Abad	NC	34,663	15.63	2217.53	High
58	Abdara	NC	24,711	81.26	304.11	High
59	Muslim Abad	NC	40,452	34.81	1162.02	High
60	Noudeh Payan	VC	20,265	108.20	187.29	Low
61	Khyber	NC	63,969	203.11	314.95	High
62	Malkandher	NC	31,378	526.45	59.60	Low
63	Umar Farooq	NC	92,417	489.28	188.88	Low
64	Industrial State	NC	35,661	364.22	97.91	Low
65	Hameed Abad Salar Qilla	VC	25,311	947.65	26.71	Low
66	Tatara	NC	39,967	291.02	137.33	Low
67	Kafoor Dheri	VC	11,774	597.53	19.70	Low
68	Ghaljai Kandar Khel	VC	23,193	143.89	161.19	Low

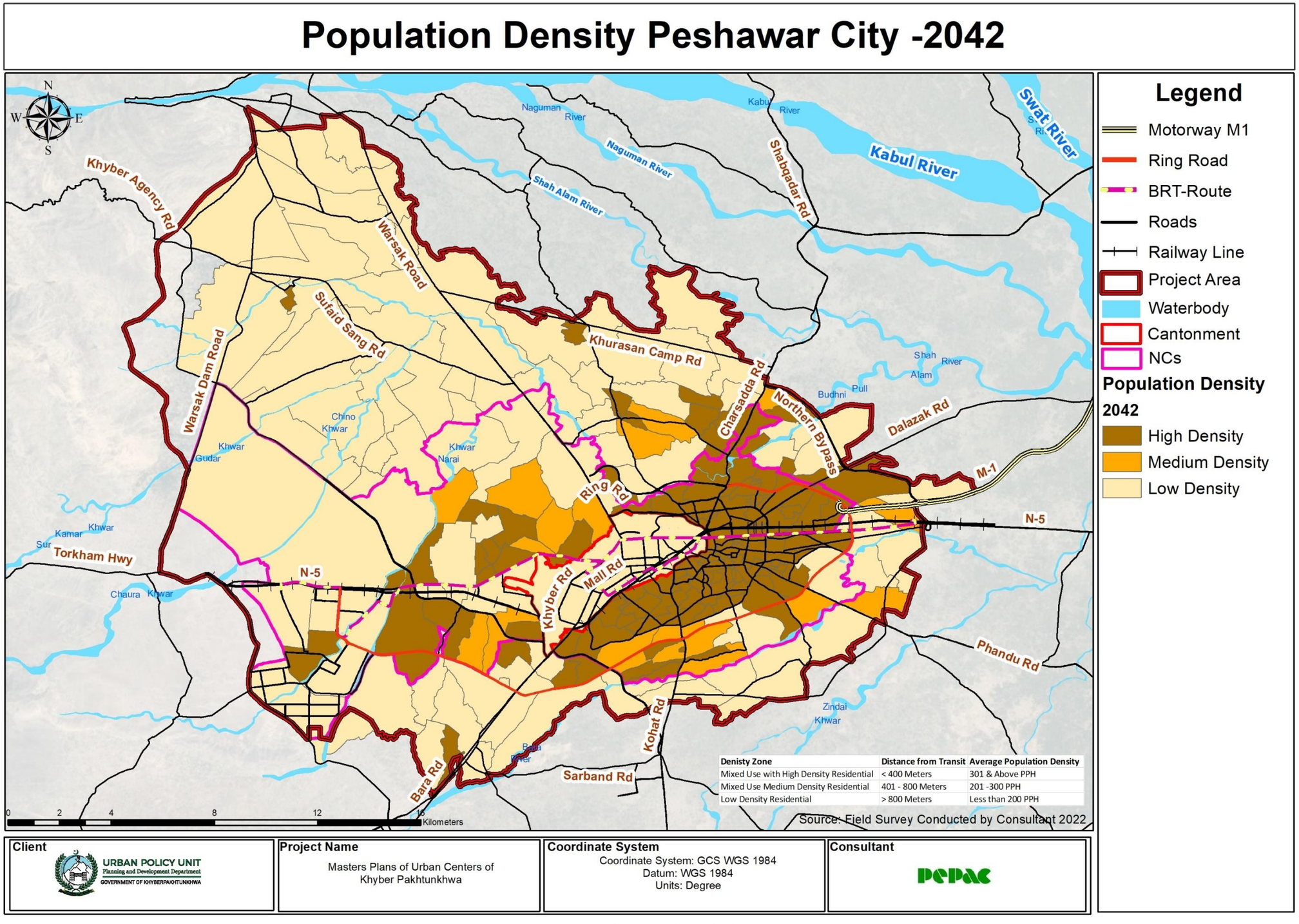
Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
69	Garhi Chandan	VC	26,656	558.88	47.70	Low
70	Garhi Sherdad	VC	25,311	267.78	94.52	Low
71	Ali Muhammad Banda	VC	27,006	629.70	42.89	Low
72	Kochyan	VC	13,591	173.26	78.44	Low
73	Panam Dheri	VC	14,250	857.69	16.61	Low
74	Nauthia Jadeed-II	NC	29,666	25.48	1164.40	High
75	Sufaid Sung-I	VC	34,295	428.04	80.12	Low
76	Regi Badezai	VC	14,660	83.07	176.49	Low
77	Shahi Bala	VC	64,916	731.41	88.75	Low
78	Bridge Nasir Khan	VC	15,477	351.05	44.09	Low
79	Regi Lalma	VC	17,116	438.82	39.00	Low
80	Regi Rukezai	VC	22,060	542.50	40.66	Low
81	Regi Lalma	NC	17,116	2886.63	5.93	Low
82	Nauthia Jadeed-I	NC	41,935	29.23	1434.58	High
83	Landi Bala	VC	24,232	190.47	127.22	Low
84	Dhora	NC	53,080	109.35	485.40	High
85	Sarband-II	VC	42,202	89.57	471.18	High
86	Nodeh Bala	NC	104,162	346.83	300.33	High
87	Lala Zar	NC	91,138	209.22	435.61	High
88	Sarband-III	VC	9,025	130.80	69.00	Low
89	Rahatabad-I	NC	48,405	76.77	630.52	High
90	Sarband-IV	VC	8,780	261.42	33.59	Low
91	Rameezi	NC	39,229	112.02	350.21	High
92	Nawab Abad	NC	31,912	143.25	222.77	Medium
93	Gharib Abad-1	NC	29,239	38.26	764.23	High
94	Shaheen Town-II	NC	51,138	351.02	145.68	Low
95	Kandi Raza Khan	NC	16,590	40.74	407.21	High
96	Palosi Atozai	NC	41,095	195.21	210.52	Medium
97	Rahat Abad-II	NC	15,314	79.29	193.13	Low
98	Danishabad	NC	43,759	330.23	132.51	Low
99	Arbaban	NC	45,837	85.47	536.29	High
100	Daud Zai	NC	46,179	163.75	282.01	Medium
101	Charanda	NC	54,474	135.08	403.28	High
102	Pajaggi	VC	22,402	56.32	397.78	High
103	Kandi Hasanzai	NC	44,247	133.66	331.03	High
104	Behari Colony	NC	35,760	149.11	239.83	Medium
105	Babu Garhi	NC	75,306	513.45	146.67	Low
106	Mandozai	NC	39,959	134.73	296.59	Medium
107	Landi Arbab-I	NC	44,326	50.59	876.21	High
108	Rashid Garhi-II	NC	39,538	19.23	2056.27	High
109	Charpariza	VC	21,095	185.39	113.79	Low
110	Daag	VC	23,165	204.16	113.46	Low
111	Faqir Garhi Fazil-II	VC	39,290	30.61	1283.72	High
112	Muslim Abad	VC	18,287	93.89	194.78	Low

Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
113	Pir Bala	VC	21,034	206.63	101.80	Low
114	Nasapa Payan	VC	25,926	86.80	298.71	Medium
115	Haryana Bala	VC	50,526	400.77	126.07	Low
116	Kukar	VC	41,240	98.88	417.09	High
117	Samar Bagh	VC	29,760	286.05	104.04	Low
118	Terai Payan	VC	15,370	129.14	119.02	Low
119	Hargoni	VC	13,211	194.50	67.92	Low
120	Putwar Payan	VC	15,342	623.63	24.60	Low
121	Mulazai	VC	45,934	464.10	98.97	Low
122	Lakari Kaniza	VC	17,471	90.57	192.89	Low
123	Choli	VC	27,343	351.02	77.90	Low
124	Terai Bala	VC	12,943	126.25	102.52	Low
125	Maqsood Abad	VC	44,359	153.91	288.21	Medium
126	Faqir Garhi Fazil-I	VC	39,290	153.76	255.52	Medium
127	Mandra Khel	VC	15,699	208.57	75.27	Low
128	Ahadi Pura	VC	30,669	67.40	455.04	High
129	Hassan Garhi	NC	25,681	47.38	542.01	High
130	Larama-II	VC	42,670	54.27	786.25	High
131	Shagi Hindkiyan-I	VC	26,623	84.60	314.69	High
132	Shagi Hindkiyan-II	VC	21,034	373.92	56.25	Low
133	Samdo Garhi	NC	39,449	38.28	1030.42	High
134	Garhi Baloch	VC	16,942	182.01	93.09	Low
135	Larama-I	VC	46,570	94.18	494.45	High
136	Din Bahar	NC	46,120	62.56	737.26	High
137	Habib Abad	NC	46,570	128.12	363.50	High
138	Ibrahim Abad	NC	36,299	102.97	352.51	High
139	Tauheed Abad	VC	34,091	45.64	746.95	High
140	Muhammadia	VC	28,264	159.58	177.12	Low
141	Siddique Akbar	VC	34,066	53.03	642.35	High
142	Ittehad Colony	NC	16,340	20.23	807.64	High
143	Saeed Abad	NC	33,343	67.83	491.59	High
144	Yousaf Abad	NC	43,111	14.79	2914.06	High
145	Kishwar Abad	NC	43,144	138.39	311.77	High
146	Qazi Kallay	NC	108,797	77.78	1398.80	High
147	Afghan Colony	NC	47,864	56.02	854.40	High
148	Garhi Rajkol	NC	67,504	92.89	726.74	High
149	Wazir Colony	NC	53,251	65.94	807.52	High
150	Latif Abad	NC	58,838	43.72	1345.95	High
151	Faqir Abad	NC	33,343	63.18	527.74	High
152	Abaseen	NC	35,207	24.24	1452.19	High
153	Pahari Pura	NC	70,000	118.44	591.00	High
154	Sirbiland Pura	NC	76,837	103.70	740.94	High
155	Chughal Pura	VC	42,218	214.99	196.37	Low
156	Sardar Garhi	VC	28,652	142.45	201.14	Medium

Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
157	Qadir Abad	NC	41,465	67.86	611.05	High
158	Gul Bahar-II	NC	49,403	29.59	1669.62	High
159	Rasheed Town	NC	49,403	31.27	1579.77	High
160	Shaheen Muslim Town-II	NC	45,546	40.22	1132.55	High
161	New Qadah Khel	VC	9,244	218.32	42.34	Low
162	Gul Bahar-I	NC	36,659	32.21	1138.05	High
163	Umar Abad	VC	6,082	176.95	34.37	Low
164	Hussain Abad	NC	26,498	22.93	1155.83	High
165	Phandu Payan	VC	39,648	175.90	225.40	Medium
166	Pir Gulab Shah	NC	36,370	16.12	2256.27	High
167	Gul Bahar-IV	NC	42,437	275.69	153.93	Low
168	Afridi Garhi	NC	24,798	75.90	326.72	High
169	Molvi Abdul Hakeem	NC	36,370	6.53	5566.71	High
170	Shah Masoom	NC	32,361	13.11	2468.18	High
171	Chowk Nasir Khan	NC	34,339	20.73	1656.64	High
172	Ghanta Ghar	NC	27,108	12.90	2100.85	High
173	Gul Badshah Jee	NC	41,656	15.99	2605.36	High
174	Wali Abad	VC	29,142	87.04	334.80	High
175	Basti Pawaka	NC	34,903	163.39	213.62	Medium
176	Shaheed Abad	VC	21,371	64.56	331.01	High
177	Garhi Sikander Khan	VC	38,788	76.81	504.97	High
178	Pishtakhara Bala	VC	31,125	451.56	68.93	Low
179	Pishtakhara Payan	VC	30,819	164.73	187.08	Low
180	Nauthia Qadeem-II	NC	29,507	16.09	1834.07	High
181	Landi Akhoon Ahmad	VC	34,262	424.04	80.80	Low
182	Civil Quarter	NC	18,887	26.02	725.77	High
183	Charkhana	NC	80,959	153.44	527.62	High
184	Muhalla Kander	NC	40,786	33.17	1229.76	High
185	Gul Berg	NC	66,694	63.38	1052.30	High
186	Nauthia Qadeem-I	NC	33,075	31.11	1063.17	High
187	Kotla Mohsin Khan	NC	46,279	39.91	1159.72	High
188	Dheri Baghbanan	NC	52,373	39.30	1332.80	High
189	Qaid Abad	NC	44,806	33.95	1319.72	High
190	Landi Arbab-II	NC	49,816	180.78	275.56	Medium
191	Lala Rukh Colony	NC	52,373	40.92	1279.82	High
192	Rashid Garhi-I	NC	38,014	43.13	881.49	High
193	Gharib Abad-II	NC	27,524	277.73	99.10	Low
194	Sadozai	NC	73,540	199.25	369.07	High
195	Achar-I	NC	40,750	102.26	398.51	High
196	Marozai	VC	30,972	233.33	132.74	Low
197	Shceme Chowk	VC	32,320	208.82	154.78	Low
198	Ahmad Khel	VC	27,409	154.10	177.87	Low
199	Sufaid Sung-II	VC	28,494	26.72	1066.41	High

Sr. No	NC VC Name	Type	Projected Population 2042	Area (Hectares)	Density 2042 (PPH)	Density Scale
200	Lakarai	NC	16,090	184.10	87.40	Low
201	Bahadar Kalay	NC	32,583	94.55	344.63	High
202	Baqir Shah	NC	24,466	12.21	2003.62	High
203	Patwar Bala Budha	VC	12,769	442.24	28.87	Low
204	Abu Bakar Saddique	NC	19,124	477.20	40.08	Low
205	Akhoon Abad-I	NC	29,398	23.66	1242.55	High
206	Achar-II	NC	29,398	102.46	286.91	Medium
207	Nawaz Abad	NC	35,207	22.16	1589.01	High
208	Duran Pur	VC	29,660	27.88	1063.98	High

Map 6: Future Projected Population Density Map for 2042 – Peshawar Study Area



Source: Devised by Consultant

4.5. Population Projection

According to the census of 2017, the population residing in Peshawar comes to the total of 1,969,823 (including cantonment and Peshawar University TC) residing in 224,099 households. However, the calculated population of the study area in 2017 appeared to be 2,868,714 people. In 1998, the population of Peshawar MC was 910,807 which has increased by 48% over the 19 years. The annual average growth rate (AGR) calculated over the 19 years is 3.72% while the one calculated from 1981 to 1998 is 3.51%. The AGR has increased during the stretch of two consecutive censuses. Contrarywise, the average household size has decreased in this passage of time from 8.3 in 1998 to 7.97 in 2017. This indicates, by and large, an improvement in quality of life.

The detailed population projection has been discussed in the 3rd deliverable and Annexure V of Volume III. The average population projection for the Peshawar study area is obtained from the previously determined population in the three techniques namely Arithmetic Method, Exponential Growth and Geometric Growth Method.

Table 7: Population Projection using three methods

Method	Base Year	Projection				
	2017	2022	2027	2032	2037	2042
Arithmetic Method	2868,714	3,365,003	3,861,292	4,357,581	4,853,870	5,350,159
Exponential Growth	2,868,714	3,357,289	3,845,863	4,334,438	4,823,012	5,311,587
Geometric Method	2,868,714	3,443,498	4,133,447	4,961,636	5,955,763	7,149,077
Average	2,868,714	3,388,596	3,946,867	4,551,218	5,210,882	5,936,941

Source: Devised by Consultant

The projected population from year 2022 to 2042 reflects that the population of the city will continue to grow from 3.38 million to 5.9 million; an addition of approximately 2.5 million people over the course of 20 years with average growth rate of 3.59%. The average projected population and growth rates are shown in the below tables:

Table 8: Growth Rate Projection Using Average Projected Population (2022-2042)

Projection Using Different Methods	Base Year	Projection					
	2017	*2022*	*2027*	*2032*	*2037*	*2042*	*Average*
Average Population Increase	2,868,714	3,388,596	3,946,867	4,551,218	5,210,882	5,936,941	N/A
Average Growth Rate Increase	3.72	4.38	3.55	3.40	3.29	3.20	3.59

Source: Devised by Consultant

4.6. Spatial Urban Form and Urban Morphology

The analysis of spatial pattern and Land Uses play a critical role in understanding the planning, management, and monitoring of an area as it helps in the recognizing the urbanization, change in land use, mobility pattern and growth trend of any area. Moreover, it also aids in

understanding different land use issues i.e., conformable, or non-conformable uses, and helps in the formulation of policies and programmes necessary for future development.

Land Use of the city can be classified by using recognised scientific and statistical methods of analysis obtained from primary or secondary data sources. In case of Peshawar, existing land use of the study area was assessed through ground thrusting (field verification) by visiting each block or parcel and observation was recorded of both spatial data and its attributes on maps as well as through Open Data Kit (ODK) by giving a unique ID to each block or parcel of the built-up area. The advancement in the computer based Geographical Information System has made the spatial analysis relatively easier with high degree of accuracy. The ArcGIS software of Environmental Systems Research Institute (ESRI) was used for screen on digitization of the land use data collected from the and using various analytical tools of ArcGIS different types of base maps were prepared.

Based on data collected by the survey team, different GIS maps were prepared for the Peshawar city. All existing land uses in Peshawar were classified and shown in the maps combined as well as separately including residential, commercial, industrial, agriculture, water bodies, social infrastructure, and physical infrastructure. Residential land use is an area that is currently or intended to be used for housing purposes predominantly including houses, apartments, condominiums, and multi-storey buildings. Some of the minor land uses that also fall under residential include educational institutes, small level commercial shops (convenience shops) and small health institutes. Residential land can be found in small patches in agriculture and industrial land uses as well for the primary purpose of providing accommodation to the farmers/labour/employees.

4.6.1. Urban Morphology

Like many other old historical cities of Pakistan, the inner-core of Peshawar city consists of a walled city with controlled entry and exit. The Peshawar walled city has sixteen gates with the expansion of the city most of these gates has been eliminated, however, a few gates still exist. Peshawar do have many urban layers reflecting its deep routed history. Many of the important historical landmarks such as Sir Cunningham Clock Tower, Gorkhatri, Chowk Nagdhar, Bala Hisar Fort, Masjid Mahabat Khan are located in the central parts of the city. Over the years, and in the absence of a master plan or other spatial development control tools, Peshawar experienced an organic growth spatial growth. The city expanded in all directions

Sir Cunningham Clock Tower, 1900

along the radial roads towards East, West, and South. However, in the past the presence of prime agriculture land acted as a barrier to the urban expansion of Peshawar in the northern direction but currently it is the most attractive direction for spatial growth of the city. The Inner city is famous for specialized commercial districts (bazzars) like Kissa Khwani Bazaar is famous for Chai and Qehwa houses, and also because several famous Indian movie actors have origins and family ties in the region. Indian film actor Dilip Kumar was born in Qissa Khwani Bazaar on or about 11 December 1922. Actor Raj Kapoor and his uncle, actor Trilok Kapoor were also born in this area. Actor Shah Rukh Khan's family still lives in the area. Andher Sheher bazaar is famous for gold Jewellery, precious stones and antiques other important commercial districts or bazaars of old city of Peshawar are: Misgharan (utensils made bronze), Raithi Bazar (construction tools), Numak Mundi (previously for salt trade but currently for mutton tikka), Shoba Bazar (used vehicles spare parts), Mohllah Jangi (printing and publications).

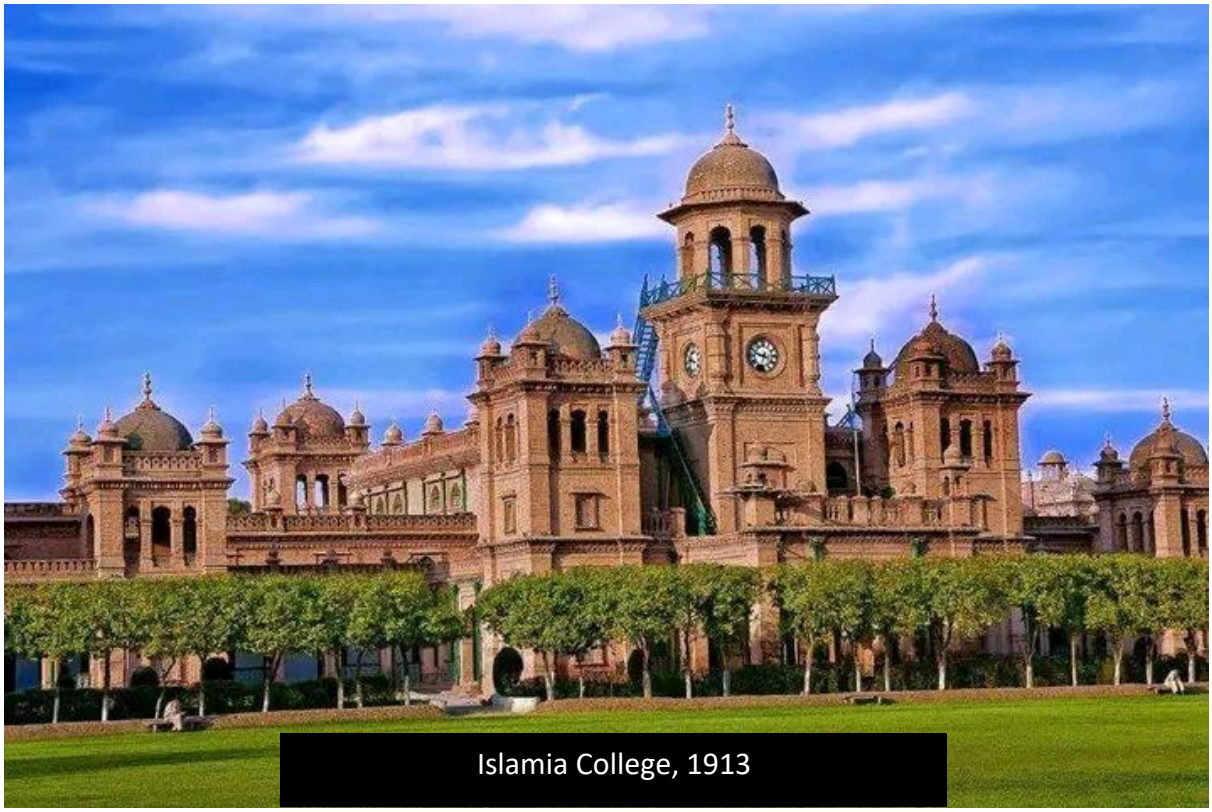
The British rulers added a military cantonment in 1866 to the west of the walled city, where they maintained a large garrison to control the region. With the addition of cantonment, the administrative limits of Peshawar increased. It was the first major sprawl in Peshawar Urban Area. Unlike the walled city of Peshawar, the Cantonment had a gridiron pattern of roads and was the first planned expansion outside the walled city. In the early 20th century, the establishment of Islamia College (1913), became a nucleus and a major growth point that pulled the growth of the city to the west, however, except from the University Town which was developed in 1952 a planned residential scheme the rest of the rural settlement around the cities like Safehd deri, Tehkal Bala and Payeen etc expanded haphazardly and with the passage of time merged with the city.

The Southern side of the city in encircled by a ring road. Being a valley, several water channels pass through and around the Peshawar city. Presence of such water bodies also poses a threat of pluvial and riverine flooding in the city. The recently constructed Motorway M-1 acts also as an embankment in the north-eastern part of the city. The overall urban form cannot be designated as a specific urban pattern as most of the city has been developed in a haphazard, and unplanned manner, except few areas such as the new housing areas approved by the local authorities and the centrally located cantonment area. The Peshawar International Airport is also located adjacent to the cantonment area. Presence of these two high security areas make the city central part somehow fragmented which defies the balanced growth of the city. In due course of expansion, Tehkal Bala, Tahkal Payan, Hazar Khwani, Nauthia, Landi Arbab Chughalpura, Sardar Garhi, Babu Garhi, Pahari Pura, Deh Bahadur, Malakander and Pakha Ghulam were also engulfed into expanding city. Residential expansion also started around the wall city and cantonment. Among the new residential areas were Nishtar Abad, Gul Bahar Colony, Sheikh Abad, Zeryab Colony, and Faqir Abad in the East and Gulberg, Danish Abad, and Shaheen Town, Nauthia Jadeed etc. in the west.

More than 80% of Peshawar has been developed haphazardly without any planning and the result is lack of open and green spaces. The notable green spaces within the urban boundaries

are Wazir Bagh, Jinnah Park, Garrison Park, PAF Gold Club Peshawar, City Amusement Park, Khalid Bin Waleed Park, Chacha Younas Park, Baghi Naran, Ghani Bagh, Tatara Park and development of Peshawar Zoo is a recent addition to the open spaces of Peshawar.

The urban fabric of Peshawar is also marked by all kind of educational institutions from nursery schools to universities. The Islamia College was established during the British period in 1913 On GT Jamrood Road. The main building of the college is an excellent example of Islamic architecture. The University of Peshawar, the University of Engineering and Technology Peshawar, and the Peshawar Agriculture University are some of the most significant public sectors educational institution of the city.



Islamia College, 1913

Another significant element of the Peshawar urban landscape is the health related medical and teaching facilities along the National Highway N-5 (Old GT Road) in the western side. The most significant and oldest hospital in Peshawar is Lady Reading Hospital constructed in 1927 during the British rule on the name of the spouse of Lord Reading and is known as Lady Reading. Other major medical institutions are Khyber Medical University, Hayatabad Medical Complex, Peshawar Institute of Cardiology, Rehman Medical Institute, Mersi Hospital, Kuwait Hospital, and North West General Hospital. Dubgari Garden is another important location in Peshawar where all most all kind of medical facilities are available. A good chunk of the city open spaces consists of grave yards. There are more than 20 graveyards located in various quadrants of the city. Some notable graveyards are Hazar Khawani, Pishtakhera, Regi, Palosai, Nadan Baba, and Durrani. These graveyards are potential places for enhancing green cover of the city through tree plantation.

Chapter 5 - Comparative Analysis of Existing Land Use

5.1. Existing Land Use Pattern

The most suitable scenario for the Peshawar Study Area's master planning has been determined by examining three key factors: existing land use categorization, administrative and planning area boundaries, and a spatiotemporal analysis of the past 20 years. Peshawar City, comprising the Urban Area Peshawar and Peshawar Cantonment, is significantly urbanized. In the master planning of the Peshawar Urban Centre, the study area includes multiple neighborhood councils (NCs) and village councils (VCs). While the NCs are nearly fully developed, the selected VCs remain partially built, primarily consisting of agricultural land. The vacant spaces within the NCs are designated for infill development, whereas the VCs, excluding their built-up portions, are earmarked as "proposed areas" for future urban expansion. Additionally, Peshawar Cantonment, located within the study area boundary, is designated as a restricted area under the Cantonment Act of 1924.

Within the study area, there are 77 village councils covering 210.91 km², 130 neighborhood councils covering 150.22 km², and a cantonment area spanning 7.11 km². The major land use categories were developed based on the classifications provided in the Khyber Pakhtunkhwa Land Use and Building Control Act of 2021. These primary categories were further subdivided; for instance, agricultural land use was split into agriculture and orchards, while commercial land use was divided into wholesale, retail, and other commercial activities such as workshops, convenience shops, and petrol pumps. Residential land use was categorized into planned and unplanned, with planned residential areas limited to approved housing schemes in Peshawar. The study also accounted for arterial connectivity, including major highways, primary roads, and secondary roads traversing the area.

The following table shows the area as well as the percentages of different other land uses in the city of Peshawar for the year 2022:

Table 9: Detailed Land Use (By Category) – Peshawar Study Area

Main Category	Sub-Category	Area (Acre)	Area (sq.km)	Percentage (%)
Residential Area	Residential	22,577.39	91.37	23.02%
Commercial Area	Commercial Area	3,173.04	12.84	3.24%
Industrial Area	Industry	843.85	3.41	0.86%
Agriculture Area	Agriculture	43,786.40	177.20	44.65%
	Orchard	103.33	0.42	0.11%
Concentrated Public Sector Area	Public Building	161.01	0.65	0.16%

Main Category	Sub-Category	Area (Acre)	Area (sq.km)	Percentage (%)
	Religious Building	212.15	0.86	0.22%
Recreational Area	Park & Playground	808.16	3.27	0.82%
	Recreational Buildings	31.74	0.13	0.03%
Mixed Land Use	Mixed Use	5.96	0.02	0.01%
Barren and Vacant	Vacant	9,697.66	39.25	9.89%
Waterbodies	Waterbody	1,403.81	5.68	1.43%
Amenities (Any Other Identified During Survey)	Airport	682.51	2.76	0.70%
	Education	1,552.63	6.28	1.58%
	Graveyard	1,655.44	6.70	1.69%
	Grid Station	15.24	0.06	0.02%
	Health	308.83	1.25	0.31%
	Road	7,946.33	32.16	8.10%
	Parking	6.77	0.03	0.01%
	Railway Line	171.63	0.69	0.18%
	Railway Station	13.78	0.06	0.01%
	Sewerage Treatment Plant	26.92	0.11	0.03%
Restricted Area	Peshawar Cantonment	1,757.87	7.11	1.79%
	PAF Airbase	114.90	0.46	0.12%
	Army Land	1,000.72	4.05	1.02%
Total		**98,058.09**	**396.83**	**100.00%**

Source: Primary Data Collected from Field Survey

The residential area dominates a significant portion of the land, covering 91.37 sq.km (23,02%) of the total area, reflecting the city's dense population and the need for housing. Commercial areas occupy 12.84 sq.km (3.24%), illustrating the presence of retail and business activities essential for the city's economy.

Industrial areas are relatively small, with 3.41 sq.km (0.86%), indicating limited industrial development within the urban boundaries. Agriculture remains a substantial part of

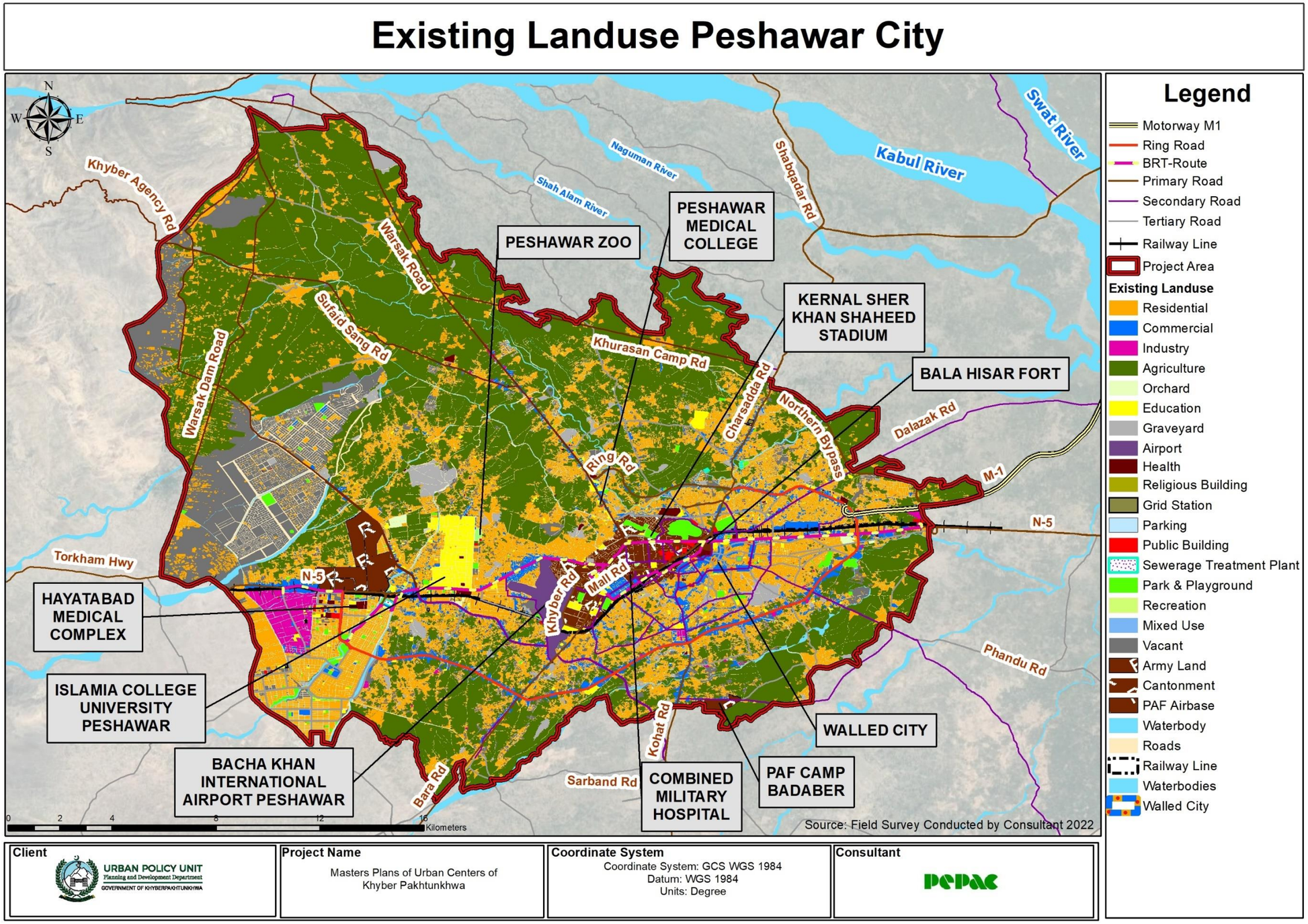
Peshawar's land use, covering 177.20 sq.km (44.65%), which includes a small portion of orchards at 0.42 sq.km (0.11%), highlighting the city's agrarian roots.

Public sector areas, including public buildings and religious buildings, account for 1.51 sq.km (0.38%), while recreational areas such as parks and playgrounds cover 3.40 sq.km (0.85%), providing essential green spaces for residents. The mixed land use category is minimal, at 0.02 sq.km (0.01%), signifying limited areas where multiple uses coexist.

Barren and vacant lands constitute 39.25 sq.km (9.89%), indicating potential for future development. Waterbodies cover 5.68 sq.km (1.43%), adding to the environmental and aesthetic value of the city. Various amenities, including educational institutions, health facilities, and transportation infrastructure, spread across 50.04 sq.km (12.61%), underscore the city's provision of essential services.

Finally, restricted areas, including military lands such as the Peshawar Cantonment and PAF Airbase, cover 11.62 sq.km (2.93%), reflecting the strategic importance of these zones within the city. Overall, the total area of Peshawar amounts to 396.83 sq.km (100%), with each land use category contributing to the city's unique urban fabric.

Map 7: Existing Land Use Distribution - Peshawar Study Area



Source: Devised by Consultant

5.2. Existing Land use Comparison with Standards

There are no established standards for comparing land use requirements at the city level, and it's not recommended to make such comparisons due to variations in socio-economic, cultural, and industrial factors that differ from city to city. Additionally, since promoting vertical development within a city is encouraged, the need for additional land for development becomes unnecessary. However, a brief comparison has been conducted using Land Use Distribution at Town/City Level (500,000+ Population) from the District Land Use Plan of Peshawar 2019, and NRM standards for a city with a population of 500,000+ individuals.

Table 10: Existing Land Use Comparison with NRM Standards

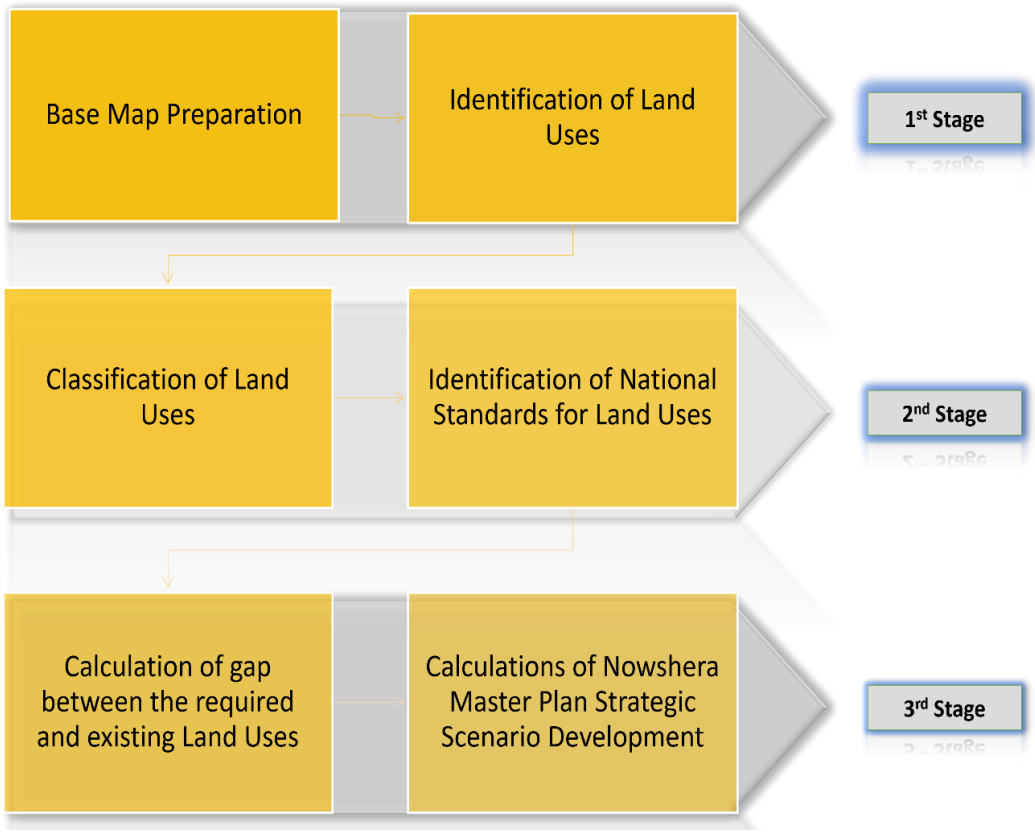
Sr. No.	Land Use	Existing Area (Km^2)	Existing Land Use Percentages	Land Use Distribution at Town/City Level (500,000+ Population) given in District Land Use Plan 2019	NRM Standards for city of 100,000 to 499,999 people
1	Residential	91.37	24.31%	45-52%	24-32%
2	Commercial	12.84	3.42%	2-3%	1-2%
3	Community Facilities (Health, Education, Mixed Use, Religious, Public etc.)	9.13	2.43%	7.5-10%	3-8%
4	Green/Recreational/ Open Spaces	3.40	0.90%	5-7.5%	2-5%
5	Graveyard	6.70	1.78%	-	0.5-3.5%
6	Vacant and Barren land	39.25	10.44%	-	9-45%
7	Roads	32.16	8.56%	25-30%	13-20%
8	Industry	3.41	0.91%	-	2-15%
9	(Reserved (agriculture, orchard etc)	177.62	47.25%	2-5%	
10	**Total area**	**375.88**	**100.00%**	**-**	**-**
11	Restricted Areas Waterbody, Cantonment etc)	20.95	-	-	-
12	**Total Boundary Area**	**396.83**	**100.00%**	-	-

Source: Devised by Consultant

5.3. Analysis of Future Land Use Requirements as Per NRM Standards

Future requirement estimation is a critical step in Peshawar Master plan, as it helps in the planning and management of land resources, which are finite and essential for human well-being and economic development. It determines the amount of land that will be required for different land uses, such as residential, commercial, industrial, and institutional uses. The land demand can support sustainable development and guarantee that land is used effectively. Future land requirements are influenced by a variety of sociological and economic factors, existing land use regulations, and the regional physical characteristics. For integrated development, the proposals for Peshawar are based on assessments future land use requirement as per NRM Standards. The stages of Land use demand calculation can be broken down into the following three stages:

Figure 8: Stages of Land Use Demand Calculations


Base Map Preparation
Identification of Land Uses
1st Stage
Classification of Land Uses
Identification of National Standards for Land Uses
2nd Stage
Calculation of gap between the required and existing Land Uses
Calculations of Nowshera Master Plan Strategic Scenario Development
3rd Stage

Source: Devised by Consultant

The estimation of future built-up area demand is done by using NRM standards. The process typically involves several stages, beginning with the preparation of a base map of the study area and the identification of various land uses for classification. Next, the existing land uses are compared to the national standards set out in the NRM to determine any discrepancies. These comparisons enable the identification of any gaps between the existing land uses and the required estimates. Through this approach, it becomes possible to estimate the demand for land and to develop strategies for the optimal use of available land resources. The process

helps to ensure that land is used efficiently, sustainably, and in accordance with national standards, promoting economic growth, and human well-being.

A detail Land use survey has been carried out for the existing land use area. Like every urban area, Peshawar also consists of several land use zones with significant residential, commercial, and public buildings. The land use categories have been developed using National Reference Manual. The major land uses are agriculture and vacant, commercial, residential, institutional buildings including health, education, public building, mixed-use and religious buildings. Land demands are estimated with detailed existing data of land uses.

5.3.1. Analysis I for Land demand Estimation

The first analysis has been made on the approach to calculate future land requirement on the overall study area including all the vacant/agriculture within NCs and VCs. By considering the entire study area, including vacant and agricultural land, we obtain a holistic view of the city's current and potential future land resources. While proposing land uses for the incremental population, it will provide an opportunity to identify suitable locations for residential, commercial, and industrial development, taking into account the city's growth projections and the need for adequate infrastructure.

The table presents an extensive analysis of future land demand estimation for Peshawar City based on different land use categories described in National Reference Manual and KP Urban Policy. Since the current population of Peshawar Study Area is ***3,388,596***, the analysis below considers the population range of 500,000 above people and follows the National Reference Manual Standards (NRM) for land use allocation.

Table 11: Land Demand Calculation Analysis – Peshawar

Land Use Categories	Recommended Land Use Allocation Standard (For Population above 500,000)	Existing area (Acres)	Existing Areas Percentage	2022 Population: 3,388,596		2042 Population: 5,936,941			
				Minimum Requirement (Acres) 2022	Maximum Requirement (Acres) 2022	Minimum Requirement (Acres)	Maximum Requirement (Acres)	Gap Minimum (Acres)	Gap Maximum (Acres)
National Reference Manual Standards (NRM)									
Residential	**24-32%**	22,577.39	**24.31%**	22,292.63	29,723.50	2,2292.63	29,723.50	-284.76	7,146.11
Commercial	**1-2%**	3,179.00	**3.42%**	928.86	1,857.72	928.86	1,857.72	-2,250.14	-1,321.28
Industrial	**2-15%**	843.85	**0.91%**	1,857.72	13,932.89	1,857.72	13,932.89	1,013.86	13,089.04
Institutional	**3-8%**	2,256.63	**2.43%**	2,786.58	7,430.88	2,786.58	7,430.88	529.95	5,174.24
Roads	**13-20%**	7,946.33	**8.55%**	12,075.17	18,577.19	12,075.17	18,577.19	4,128.84	10,630.86
Vacant/Barren/Agri/Orchard	**9-45%**	53,587.39	**57.69%**	8,359.74	41,798.68	8,359.74	41,798.68	-45,227.65	-11,788.71
Recreational Open space	**2-5%**	839.90	**0.90%**	1857.72	4,644.30	1,857.72	4,644.30	1,017.82	3,804.39
Graveyard	**0.5-3.5%**	1,655.44	**1.78%**	464.43	3,251.01	464.43	3,251.01	-1,191.01	1,595.57
Total Area		92,885.95	**100.00%**	50,622.84	121,216.16	50,623	121,216.16	6,690.46	41,440.21
Cantonment, Waterbodies, Airport land, Railway Line, Sewerage treatment Plant, PAF Air base and Army land are not included in Total area for land demand calculation									

Source: Devised by Consultants

The land demand estimates for Peshawar City have been assessed based on the projected population for the years 2022 and 2042. Given that Peshawar's population has already surpassed 500,000, the land allocation standards for a large city have been utilized in this analysis. These standards guide the allocation of land across various categories, ensuring that the city's growth is managed effectively.

Starting with residential land use, the recommended allocation standard ranges from 24% to 32% of the total area. Currently, Peshawar has 22,577.39 acres dedicated to residential purposes, which represents 24.31% of the total area. The minimum requirement for 2022 is 22,292.63 acres, while the maximum requirement is 29,723.50 acres. For 2042, the same range is applicable. This results in a gap of -284.76 acres for the minimum requirement, indicating that the current allocation is sufficient, but a potential shortfall of 7,146.11 acres for the maximum requirement suggests a need for expansion.

For commercial land use, the recommended standard is between 1% and 2% of the total area. Peshawar currently has 3,179.00 acres allocated for commercial activities, accounting for 3.42% of the total area. The minimum requirement for both 2022 and 2042 is 928.86 acres, while the maximum is 1,857.72 acres. The analysis reveals a negative gap of -2,250.14 acres for the minimum and -1,321.28 acres for the maximum requirement, indicating that the current commercial land allocation exceeds future needs, potentially requiring a reallocation of this land for other purposes.

Industrial land use presents a different scenario, with a recommended allocation of 2% to 15%. Currently, 843.85 acres are dedicated to industrial activities, making up 0.91% of the total area. The minimum requirement for both 2022 and 2042 is 1,857.72 acres, with a maximum of 13,932.89 acres. This results in a gap of 1,013.86 acres for the minimum and 13,089.04 acres for the maximum, indicating a significant need to increase the industrial land allocation to accommodate future growth.

In terms of institutional land use, which includes public buildings and facilities, the recommended standard ranges from 3% to 8%. Peshawar currently has 2,256.63 acres allocated for institutional purposes, representing 2.43% of the total area. The minimum requirement is 2,786.58 acres, while the maximum is 7,430.88 acres. This results in a gap of 529.95 acres for the minimum and 5,174.24 acres for the maximum, indicating a need for additional institutional land to meet future demands.

Roads are a critical component of urban infrastructure, with a recommended allocation standard of 13% to 20%. Peshawar currently has 7,946.33 acres dedicated to roads, accounting for 8.55% of the total area. The minimum requirement for both 2022 and 2042 is 12,075.17 acres, while the maximum is 18,577.19 acres. The analysis shows a gap of 4,128.84 acres for the minimum and 10,630.86 acres for the maximum, indicating a need for significant expansion of the road network to support the city's growth.

The vacant, barren, and agricultural/orchard land category is substantial, with 53,587.39 acres currently allocated, representing 57.69% of the total area. The recommended standard for this category ranges from 9% to 45%. The minimum requirement is 8,359.74 acres, while the maximum is 41,798.68 acres. This results in a negative gap of -45,227.65 acres for the minimum and -11,788.71 acres for the maximum, indicating that the existing allocation far exceeds the recommended range, suggesting potential for reallocation to other land uses.

Recreational open space is another important category, with a recommended standard of 2% to 5%. Currently, 839.90 acres are allocated to recreational purposes, accounting for 0.90% of the total area. The minimum requirement for both 2022 and 2042 is 1,857.72 acres, while the maximum is 4,644.30 acres. The analysis reveals a gap of 1,017.82 acres for the minimum and 3,804.39 acres for the maximum, indicating a need to expand recreational spaces to enhance the quality of life for residents.

Finally, the graveyard category, with a recommended allocation standard of 0.5% to 3.5%, currently has 1,655.44 acres dedicated, making up 1.78% of the total area. The minimum requirement is 464.43 acres, while the maximum is 3,251.01 acres. This results in a negative gap of -1,191.01 acres for the minimum, indicating that the current allocation exceeds the requirement, but a positive gap of 1,595.57 acres for the maximum, suggesting a potential need for additional land in the future.

Chapter 6: Review of Previous Spatial Development Plans

6.1. Review of Spatial Development Plans (Master Plans/Structure Plans & Land Use Plans) and associated Legal and Institutional Framework.

The preparation of spatial development plan including a land use plan or master plan and or structure plan is a complex technical and political matter. Land use planning refers to the process by which land is allocated between competing and sometimes conflicting uses in order to secure the rational and orderly development of land in an environmentally sound manner to ensure the creation of sustainable human settlements.

The process of land use planning consists in the main of the two twin functions of Development/Land use Planning and Development Control. Of necessity, these two functions must be supported by relevant research and mapping which are also major components of the land use planning process. People have needs that must be satisfied. For instance, they need housing; jobs; education; opportunities for recreation; transport; and basic services like water, electricity, clean air and health care. Social planning and policies attempt to take care of the basic social needs of the city's population. Economic planning and policies seek to ensure that the city has a sound economic base which provides revenue to finance government operations and pay for provision of services to the public while also ensuring that jobs are available to the city's labour force.

In past Pakistan's including the city of Peshawar the master plans, structure plans, and land use plans prepared from time to time failed to desired objectives. The basic reason for this continuous failure is the lack of dedicated institutions with sufficient resources (human and financial resources) along with required legal instruments (laws, byelaws, rules and regulations). Another important reason that leads to failure of all spatial plans is the public ownership of these plans. Most of these plans were prepared in isolation without due consultation with all relevant stakeholders including the general public. Without the establishment of proper dedicated institutions for the preparation, review and implementation of land-use plans or master plans or any other spatial development plan there is minimal chances of success, and the city will not be able to get benefits of master plans or land-use plans.

In the past though spatial development plans were made in KP but were only limited to Peshawar city. Historically, three spatial development plans were developed for Peshawar City.

6.1.1. Peshawar Master Plan 1965-1985

The first Master Plan for the Peshawar city was prepared in 1965 for a period of 20 years in the light of directive of 2nd five-year plan. During those days, neither the Municipal Committee nor any other local body in Peshawar was capable to undertake this assignment. Further, the Directorate of Town Planning in Peshawar was functioning without a qualified Director Planning and the directorate was lacking the capacity to undertake such a technical

task. Therefore, to initiate work on the preparation of the plan a Master Plan Committee was constituted under the chairmanship of the Commissioner Peshawar Division to supervise the preparation of the Plan and assist the concerned officials in the collection of various data sets required for the preparation of the master plan. As the Directorate of Town Planning lacking the required capacity to formulate master plan for Peshawar city, therefore, the task of preparation of the master plan was assigned to the Physical Planning Cell of the Directorate of Town Planning Lahore in Punjab province. The various data sets collected for preparation of the plan were shifted to Lahore and mostly through desk research the Peshawar Master plan was prepared. As the Directorate of Town Planning, Lahore was also in the process of developing master plan for Lahore City, therefore, the planning standards use for the Lahore Master Plan were also adopted for the Peshawar Master Plan. The Peshawar master plan was a well-organized report accompanied with maps of various proposals on micro scale. The draft plan was submitted the Divisional Commissioner who passed it on to the Municipal Committee for review, approval and subsequent implementation. However, in the absence of required legal provisions, the Peshawar Municipal Committee was not able to get approval of the plan. As the plan was not approved by any proper forum, therefore it was never disseminated to the line departments involved in the development of the city. In 1975 the first Physical Planning Act, 1975 was promulgated for management of urban centres of the province, however, by that time the Peshawar Master Plan has already passed half of its life and at that time approval of the plan was not a feasible option.

The Planning horizon for the Peshawar Master Plan was 20 years (1965-1985) covering an area of about 23 Km2 (including 32 villages) which was jurisdiction of the then Peshawar Municipal Committee with a total population of around 0.21 million. It is important to mention that the Master Plan was prepared without specified goals and objectives, however,

it reflected a planned approach with all basic principles of modern town planning. Technically the master plan proposed excellent recommendations for the planned growth of Peshawar City and proposals were given to guide and channelize development in the city region. The city was divided into planning units/zones according to the planning principles of hierarchy of self-contained communities. Each zone would have public amenities according to its level in the hierarchy. Due to lack of professional capacity of the concerned institutions and non-availability of funds for the initiation of the plan proposals, therefore, development in hierarchical order in the city was not realized. The provision of infrastructure and other major facilities proposed were not properly implanted and as a result the city faced deficit in housing and other infrastructure.

6.1.2. Peshawar Structure Plan 1986 – 2001

Under the 1978 Planning Ordinance, the Provincial Urban Development Board (PUDB) was established. One of the functions of the PUDB was to establish local Areas Authorities in the province (Peshawar Development Authority (PDA), Mardan Development Authority (MDA) etc) were established under PUDB. The PDA with the technical support of UNDP took the initiative of the preparation of Peshawar Structure Plan after the lapse of the Peshawar Master Plan (1965-1986). The Directorate of Town Planning of PDA hired the services of consortium of foreign and local consultants (Gilmore Hankey Kirke in partnership with Roger Tym and partners Abdullah Jan).

The consultants prepared the Peshawar Structure Plan based mostly on secondary data sets without collecting sufficient primary data from the field. However, primary data was used where required secondary data was not available. The plan properly considered all important aspect of the Structure Plan including population projections, housing demand, utility infrastructure, transport, economy and employment, and land required for future urban growth. The consultants developed a comprehensive structure plan for both new development as well as redevelopment/ regeneration of the older parts of the city. In order to achieve a balance growth, following objectives were fixed for the plan:

- Identification of a proper framework for guiding the physical growth of the city and facilitating its management.
- Formulating policies and procedure for upgrading the infrastructure and facilitation of management of the old city.
- Development of a framework for improving living conditions of the poorest segments of the urban population by: i- Preparing detailed action programs in priority areas for future capital investment projects; and ii- Strengthening the city capacity to cope with continuing urban development.

The structure plan proposed above two strategies for future expansion and recommended that during first half of the plan period (1986- 1994) development should concentrate around the old city through infilling by private sector through the provision of guided infrastructure by PDA to ensure that development may not occur in a haphazard manner. Under this strategy in the south of the walled city and the Cantonment with some growth to the north of the GT Road were considered priority areas for urban expansion. This should provide benefits to both the existing residents as well as to the low-income groups requiring houses within short travel distance to their work places. The plan recommends that during the second half development of areas should be considered in south of University Town to form link with Hayatabad and to support the ring road proposals. In the SP, the proposed organizational responsibilities of PDA and PMC have been clearly demarcated to effectively manage city's development consideration.

Most of the prime agriculture land of the district is located in the northern side of the Peshawar city, therefore, to conserve the prime agriculture land, the plan proposed that new development in the southern direction of the city where sufficient vacant land was available.

However, the PDA failed to get approve the Peshawar Structure Plan from a competent forum and as a result the plan failed to achieve its objectives.

6.1.3. Urban Planning and Development Management Structure Plan 2001 - 2020

Although the precious two spatial development plans were never approved and properly implemented but the formulation of preparing new spatial development plans continued. After the lapse of the Peshawar Structure Plan in 2001, the Urban Planning and Development Management System for Peshawar (UPDMSP) was developed in 2002 with a planning horizon of 18 years (2002-2020). The basic purpose of any spatial or non-spatial development plan is to set priorities or objectives that we would like to achieve through the proposed plan. Just like the Peshawar Master Plan (1965-1985) the UPDMSP has also no specific goal and objectives set in the plan for the future development of the city.

Through the promulgation of LGO 2001 both the PMC and PDA were made defunct and the district was divided into four town: Town I, II, III and IV eliminating the concept of urban and rural concept in the province. Therefore, the UPDMS Plan is neither a true spatial development plan (master plan and or structure plan) nor could be considered as a Regional Development Plan. Simultaneously it opted for the LGO 2001 liability to relinquish rural urban divide and considered the whole district's union councils' population. It also considered social and physical infrastructure in its analysis, and focused only on Town-I and Town-III which were predominantly urban in character for its structure plan proposals while leaving aside Town-II and Town-IV which are predominantly of rural character. This deviation in opinion could not help them to turn up an explicit plan for the concerned authority. The concentration of the Plan was mostly on the provision of infrastructure without taking into account other aspects of the planning process including environment and social development. The plan proposes civic community centres along Ring Road, regional radial roads intersection and identifies that land use planning and controlled development framework should take place only in these selected areas. However, under the LGO 2001, the executive authority of the City was vested with the City District Government Peshawar (CDGP), TMAs and Union Councils, while the plan custodian was the defunct PDA and after completion, it was submitted to the PDA despite the fact that the plan preparation and implementation was the prerogative of the CDGP. The Peshawar Development Authority PDA had no legal power to influence development in Peshawar except Hayatabad Township, Regi Lalma Model Town, and frontage of GT Jamrood Road and Ring Road only which are mainly commercial in nature. Housing and infrastructure development for the rest of the city comes under TMAs' function. Section 54(a) of the LGO 2001, empower TMAs to prepare physical plans (master plans, land use zoning plans) for their respective jurisdiction.

Further, the UPDMSP plan maintains that land-use planning determines density of use, therefore, the result may be the utilization of land as both the government and private owners or developers do not have enough financial resources to provide infrastructure to the extent required to meet the planning criteria. The plan is of the view that such prescriptive conditions, decrease the supply of land for immediate use, and add to the inefficiencies of

urban land. The Plan recommended less control over the urban particularly on land use along major road intersections, while the rest of the development should be left to the market forces with limited control. Due to the lack of legal cover with PDA and lack of capacity of the CDGP and TMAs the plan again not approved for implemented and the city of Peshawar experienced haphazard growth in all areas of the city.

6.1.4. Peshawar Provincial Land Use Plan 2019 – 2039

Land is a scare and finite resource, and our existence entirely depends not only on the quantity but also on the quality of this resource. We use land to fulfil our all basic needs of food, shelter, energy and other needs. There is very limited option to increase the quantity of land like reclamation of land from oceans and seas but on the other hand we have great opportunities to maintain and enhance the quality of our available land. The way we manage our land directly influences our environment, development and economy. It is centre to macro-economic growth. Productive soil, fresh water, forests, clean air, animal life and other renewable resources underpin the survival and prosperity of people across the planet. As our country move towards a rapid increase in population of over 190 million, we need to manage the land to meet our increasing needs for food, energy and water. The demand for agricultural products alone is expected to double in Pakistan in coming decades. There is immense need to scientifically document our existing land uses and developed a comprehensive land use plan for our future needs and demands. The Government of Khyber Pakhtunkhwa is cognizant of the situation and to discourage the illegal conversion of prime agriculture land to housing societies and other non-agriculture uses initiated a dedicated project under the title of Provincial Land Use Plan (PLUP) within the Urban Policy Unit (UPU), Planning and Development Department, Government of Khyber Pakhtunkhwa. The basic objective of the land use plan is to ensure the judicious uses of land and it resources. The Provincial Land Use Plan shall prepare districts land use plans for all thirty-five districts of KPK. The district land use plans for Peshawar and Mardan divisions (Distract Peshawar, Charsadda, Nowshera, Mardan and Swabi) has been approved by the Provincial Land-Use and Building Control Council in its meeting held September 14, 2022 under the Chairmanship of honourable Chief Minister Khyber Pakhtunkhwa.

6.2. Critical Analysis of the Peshawar Master Plan 1965-85, Structure Plans 1986-2001 & 2002-2020 and District Land Use Plan.

The analysis of all four spatial development plans revealed that the foremost important aspects of any planning exercise shall be setting up of a vision for the future of the city and setting of rational objectives reflecting strength of the proposed plans. Moreover, objectives provide foundation/guidance for various planning proposals and a firm basis for monitoring and evaluation process. The review of plans shows that both vision and objectives are missing in the Peshawar Master Plan (1965-1985), and UPDMS Plan (2002-2020). However, a clear cut vision and explicit objectives are provided in the Peshawar Structure Plan (1986-2001). Besides setting of goals and objectives, another important consideration is the prevailing

national and regional policies and review of the existing legal framework are other important aspects which should have been taken into account in the plan making process. Both the Peshawar Master Plan and Peshawar Structure Plan have reviewed the legal aspects and national and regional policy framework whereas UPDMSP has ignored these elements of the planning process. The involvement of stakeholders at various stages of the plan making process has been considered a key to the successful development and subsequent implementation of a physical development plan. However, the analysis of the plans revealed that consultation with line departments and community was not given due regards in the planning process of Master Plan and UPDMSP. Problem identification and forecast are the main factors which determine the planning approach for spatial expansion of a city. The review of the Peshawar Land Use Plan documents depicts that the plan has well stated objective but without a vision statement. Some of the data sets used in the plan are outdated and can't be relied upon. Although the plan covers the entire geographical of District Peshawar but most of the Planning proposals are limited to Peshawar city which seems beyond the scope of a district land use plan. The management structure provided in the land use plan is not align with both the existing local government structure of the province and Peshawar District.

On the basis of the lessons learned from the review of the previous plans, therefore for the proposed Peshawar City master plan (2022 – 2042) the fallowing planning process was adopted:

- Development of Master Plan objectives
- Through a comprehensive consultative process both the line departments and general public issues and major problems of the city were identified and a Vision statement for the City was development (deliverable No. 2 Vision Formulation and Community Consultation)
- Continuous consultation with the line departments for secondary data collection
- Collection of adequate primary data (1% of the total house hold of Peshawar city).
- Formulation of Technical Committee (consisting of 18 sectoral experts of UPU and concerned line departments) for review and approval of each deliverable
- Promulgation of the Land-Use and Building Control Act, 2021 and establishment of the Land-Use Building Control Council and Land-Use Building Control Authority (the authority is responsible for preparation of the master plans and under the Land Use and Building Control Act the council will accord approval to such plans).

Chapter No. 7- Multi-Criteria and Land Suitability Analysis

7.1. Suitability Mapping

Due distinct urban feature and issues, the assessment of appropriate land use for future development of the city becomes difficult task. This issue is further exasperated by multi-facets aspect of the planning and a variety of competing interests and solutions. In order to address this issue, GIS-based modelling is carried out by involving different stakeholders and experts. One of the benefits of employing GIS-based land suitability modelling is the capacity of GIS to construct alternative urban development scenarios. The underlying idea of GIS suitability analysis is that each feature of the areas has inherent characteristics that are either appropriate or unsuitable for the proposed land uses.

The suitability of the land uses is assessed through a methodical, multi-factor investigation of the problem's various facets. The decision-based modelling has been carried out by giving weightage to the different socio-environment and other related aspect of the land use. Weights are assigned to each input based on its relevance or degree of influence. Each input's weight is relative and must sum up to 100% to ensure that all considerations are included in the decision-making process.

7.2. Multi-Criteria Decision Analysis (MCDA)

Multi-criteria decision making is one approach used to facilitate the consideration of multiple criteria by decision makers. MCDA is used to logically evaluate and compare multiple, often conflicting, criteria in order to make the best possible decision. Especially useful when you have a wide range of stakeholders with conflicting interests, values and goals.

Though the multi-criteria analysis can be carried out in multiple ways, the consultant has pooled two criteria types into one i.e., land suitability classes and conditional suitability.

The general equation for multi-criteria analysis is as under:

$$Multi\ Criteria\ Analysis = w\ x\ C\ x\ r$$

Where;
w = specified weightage to the class.
C = Criteria or Factors involved in criteria. &
r = restrictions or constraints involved in the criteria.
Multi-criteria analysis can be performed using a variety of techniques, It can be performed using raster calculator method or it can be used using the weighted overlay method. In either case, the basic essence remains the same. The core of multi-criteria analysis revolves around the equation stated above.

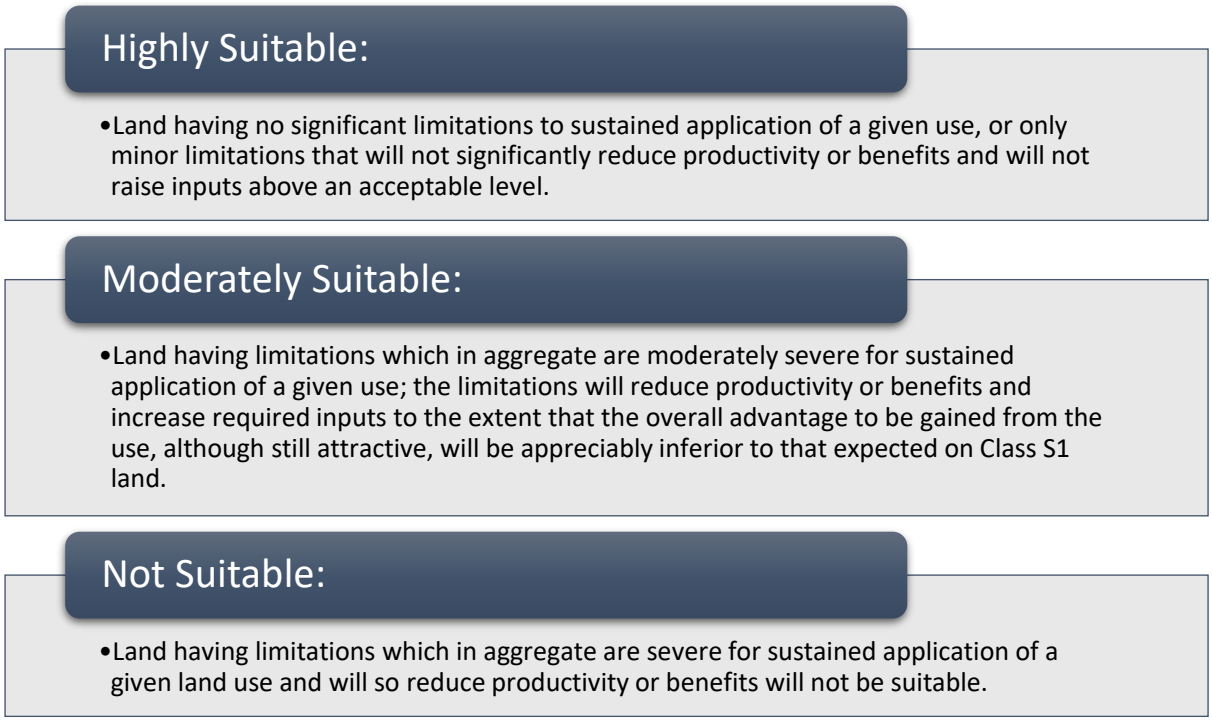
Land suitability is the aptness of a given type of land for a defined use i.e., residential, or commercial. The suitability can consider land in its existing condition or after improvements. The process of land suitability classification is the appraisal and grouping of specific areas of

land in terms of their suitability for defined uses. Multi-criteria analysis has been used to determine suitable land uses for existing land parcels.

The consultant has pooled two criterion types into one i.e., land suitability classes and conditional suitability.

Land suitability classes reflect degrees of suitability. The classes are numbered consecutively in sequence of decreasing degrees of suitability within the Order. The opted criterion provides following three suitability classes:

Figure 9: Classes of the LSA

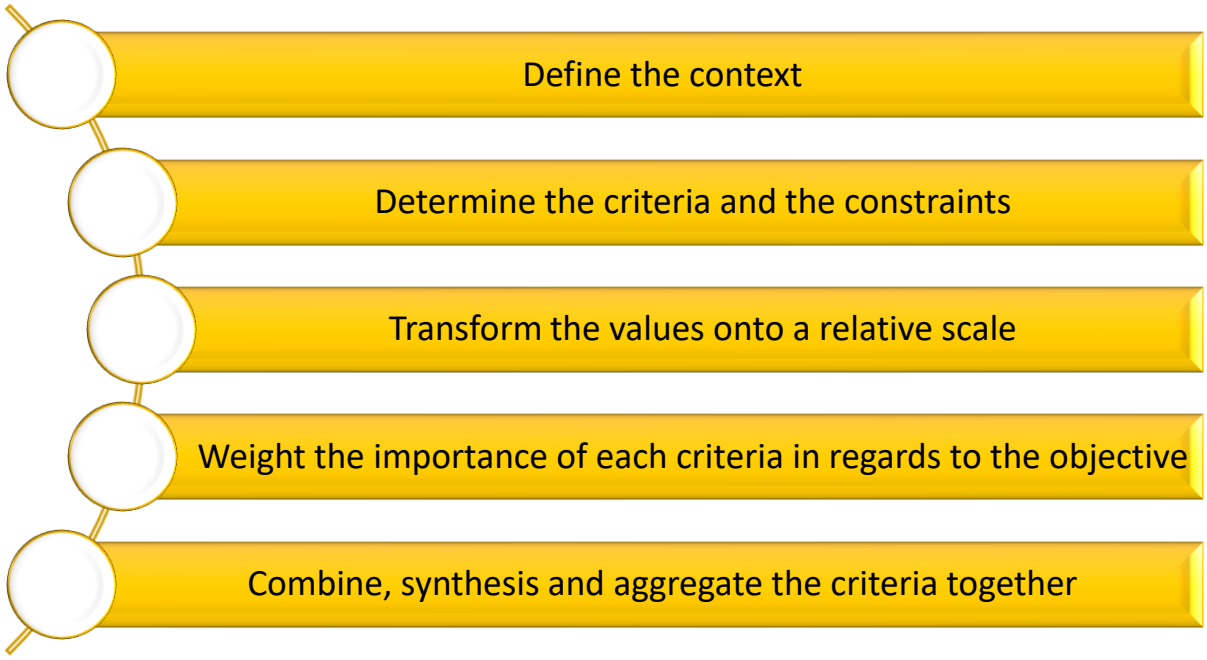

Highly Suitable:
•Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.
Moderately Suitable:
•Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on Class S1 land.
Not Suitable:
•Land having limitations which in aggregate are severe for sustained application of a given land use and will so reduce productivity or benefits will not be suitable.

Source:Devised by Consultant, 2023

7.3. Methodology of MCDA

A Multiple Criteria Decision Analysis (MCDA) is a is a structured process for evaluating options with conflicting criteria and choosing the best. The methodology of MCDA is given below:

Figure 10: Methodology of Multi-Criteria Decision Analysis (MCDA)


Define the context
Determine the criteria and the constraints
Transform the values onto a relative scale
Weight the importance of each criteria in regards to the objective
Combine, synthesis and aggregate the criteria together

Source: Devised by consultants

7.4. Analytical Hierarchy Process (AHP)

AHP introduced by Thomas Saaty in 1980, AHP is a **pairwise** comparison method to be used on the criteria in regards to the objective. These pairwise comparisons are carried out for all relevant factors within an analysis- usually no more than 7.

Figure 11: AHP Criteria Explanation

Relative importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to objective
3	Weak importance	Experience and judgment slightly favour one activity over another
5	Strong importance	Experience and judgment strongly favour one activity over another
7	Demonstrated importance	One activity is strongly favoured and demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of highest possible order of affirmation
2, 4, 6, 8	Intermediate values	When compromise is needed between two adjacent judgments

Source: Coyle, G. (2004). Analytical Hierarchy Process (AHP)

7.5. Constraint Mapping

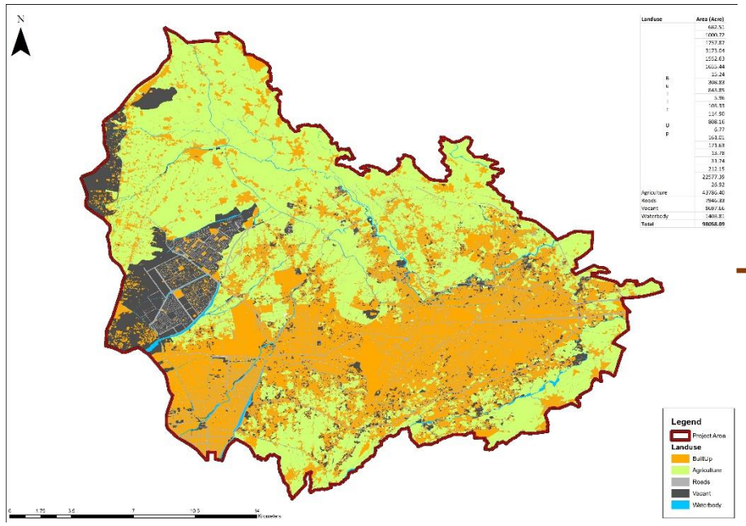
Important components of constraint maps are identification of areas that will not be considered for residential development. This the type of Boolean map composed of ones and zeros. The pixels with a value of 0 represent places that cannot be utilized stating them as constraints. On the other hand, the pixels with a value of one represent areas with no

restrictions and can be utilized for residential development as they meet the suitability requirement.

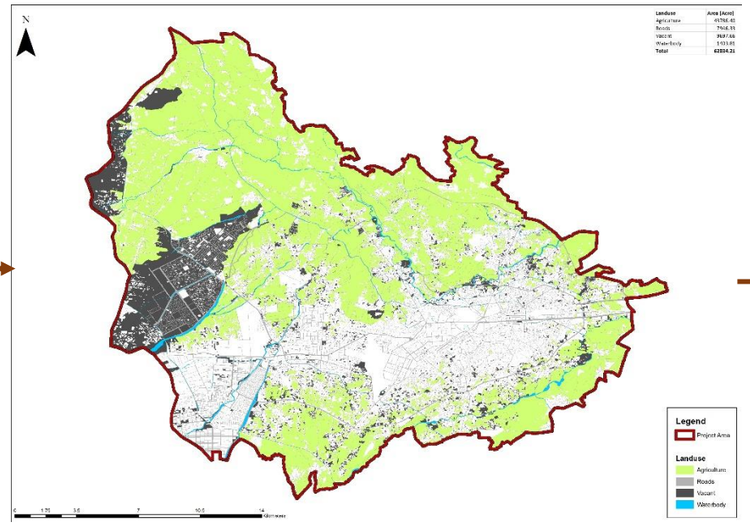
7.5.1. Method for Constraint Map Generation

To create the constraint maps, two conditions were considered. If no buffer zones were required, simply reclassify the original land use map by assigning the constraint class a value of zero and the remaining classes a value of one. On the other hand, regarding forest cover, water cover, and building cover, all the constraints are converted into zero and zeros to one, as they are all constraints for residential development and no buffers are assigned. In ArcMap, buffer analysis is applied to the original land use where buffer regions are required. The outcome of the buffer analysis is then reclassified by assigning zeros to pixels smaller than the buffer threshold and ones.

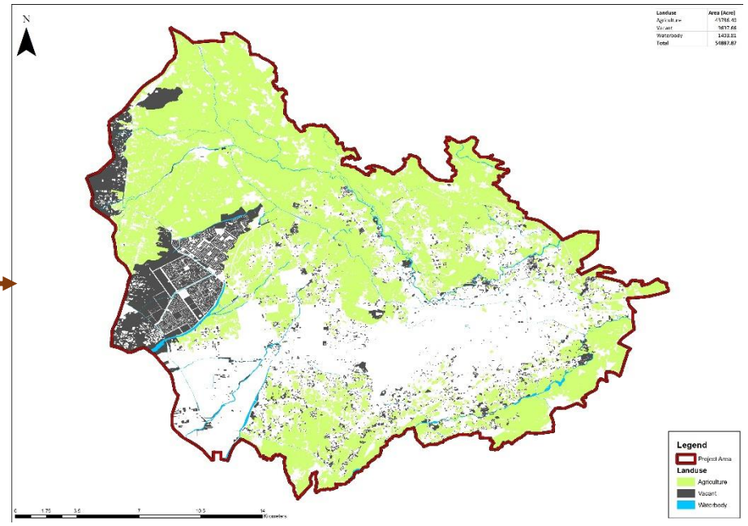
Figure 12: Constraint Mapping - Suitable land for Zoning



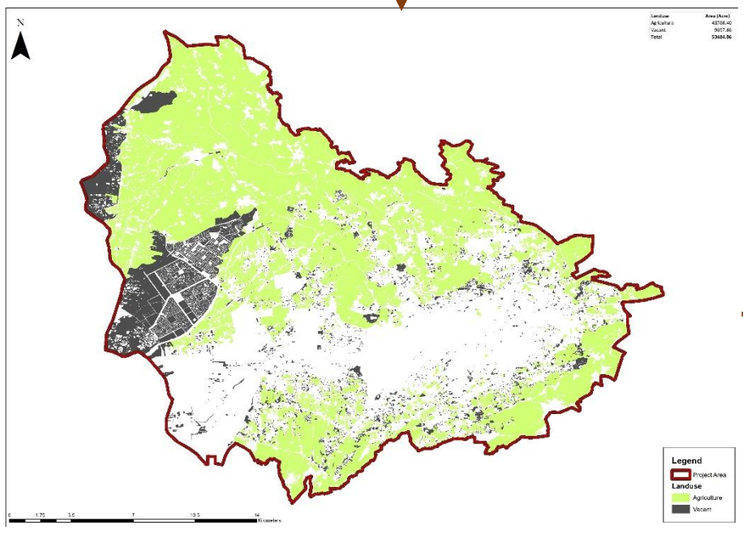
Total Project Area = ***98,058.09 Acres***



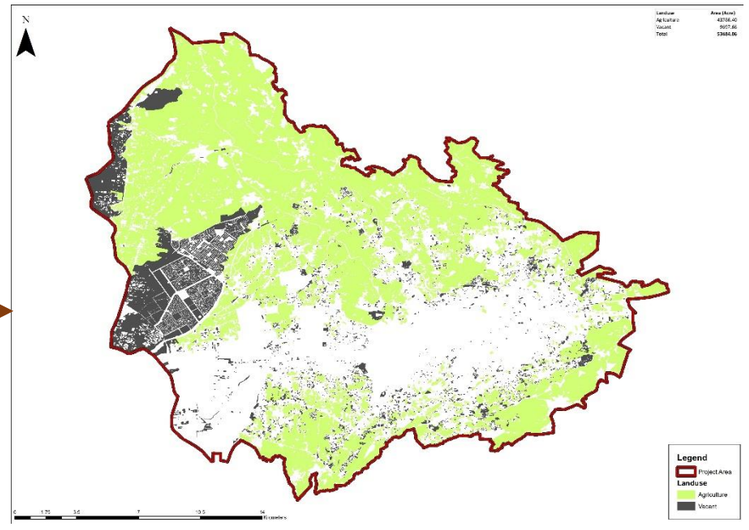
In this step, the built-up area has been eliminated from the project area.
The remaining area after eliminating built-up area= 62,834.21 Acres



In this step, the area of roads (***7,946.33*** acres) has been eliminated from the remaining area (***62,834.21*** acres) of previous map.
The remaining area after eliminating built-up area= 54,887.87 Acres



In this step, the area of waterbody (***1,403.81*** acres) has been eliminated from the remaining area (***54,887.87*** acres) of previous map.
The remaining area for zoning left is 53,484.06 Acres



The remaining area for zoning left is 53,484.06 Acres

7.6. Factor mapping

The factor mapping illustrates the several factors that affect the suitability of residential development. It permits the detection of classes or groups of persons whose descriptors are related. Unknown individuals can be simply put into factor graphics and then identified using a classification technique. The consecutive distances are usually made up of values from 0 to 255. The higher the value, the more appropriate the location for housing development.

7.6.1. Method for Factor Map Generation

Two types of factor map need to be generated. A Euclidean distance calculation was performed to generate factor maps for distance to protected drinking water sources, roads and the downtown factor map. Then, based on the relationship between the suitability of housing development and the distance, suitable scores were calculated. To generate factor maps not related to distance, as slope factor map and hazards factor map, scores of suitability varies from 0 to 255 were calculated using the relationship between the suitability of housing development and the original data.

7.7. Land Suitability Analysis (LSA) for Land uses

7.7.1. LSA Criteria for Residential

The residential criteria are made by using factors and constraints of planning development. The important factor is the proximal of land to primary and secondary road, planned residential, water body and land cover.

For the primary road, the distance between 11 to 50 meters is assigned weightage of 1 (not suitability), owing to the potential proposals within which the roads might get expanded. Following that, the distance of 51 to 1400 is given moderate suitability due to their proximity to the main roads which majorly contains commercial land use. Similarly, above 2801 are also given weight of 2 (moderately suitable) due to larger distances from the road and at this distance, most of the study area can be under the classification of open spaces. In the case of secondary roads, similar approach has been adopted for 11m to 50m and above 2901m. Whereas, both distances of 51m – 1500m and 1501m – 2900m are categorized under most suitable.

In the case of planned residential, the proximal areas are given highest priority. Area within the distance of 800m are most suitable, followed by 801 to 1600m with moderately suitable and 1,601m and above not suitable. Remaining parameter for residential land use include water body and land cover, for which area under 50 m are given not suitable, followed by 51 – 500m under moderately suitable and area above 501m for most suitable. For Land cover, built up area is not suitable, Agriculture is moderately suitable and Vacant is highly suitable. The table below shows the selected criteria for residential.

Table 12: Factors and Criteria of Residential

Criteria For Residential				
S. No	Parameters	Classes (Meters) (Degree)	Weights 1 = Not Suitable 2 = Moderate 3 = Most Suitable	Influence
1	Primary Roads	11 - 50	1	25
		51 - 1400	2	
		1401 - 2800	3	
		Above 2801	2	
2	Secondary Roads	11 - 50	1	30
		51 - 1500	3	
		1501 - 2900	3	
		Above 2901	2	
3	Planned Residential	0 - 400	3	15
		401 - 800	3	
		801 - 1600	2	
		Above 1601	1	
4	Waterbodies	0 - 50	1	20
		51 - 500	2	
		501 - 1200	3	
		Above 1201	3	
5	Land Cover	Built-Up	1	10
		Vacant	3	
		Agriculture	2	

Source: Devised by Consultants

7.7.2. LSA Criteria for Commercial

The commercial criteria are made by using factors and constraints of planning development. The important factor is the proximal of land to Primary and Secondary Roads, Existing Commercial Bazar and Land Cover.

Owing to potential proposal for road expansion, the distance between 11m and 70m on the primary road is assigned a weightage of 1 (not suitable). Following that, the distance of 71m to 800m is considered moderately suitable due to its proximity to primary roads, which primarily comprise commercial land use. Similarly, distances greater than 801 are assigned a weight of 3 (highly suitable) as most of the residential uses would be proposed at this distance. In the case of secondary roads, a similar method has been adopted in which 20m to 80m are categorized as not suitable. In contrast, the distances 81m - 900m are categorized as most suitable and above 901m are categorized as moderately suitable.

In the case of existing commercial bazar, the proximate areas are prioritized. Areas within 800m are the most suitable, followed by 601 to 1800m that are moderately suitable, and 1,800m above as not suitable. The remaining parameters for residential land use include land

cover; with already built-up areas as not suitable, while agriculture is moderately suitable and vacant is most suitable. The table below shows the selected criteria for commercial land use. The factor and constraint maps for commercial land suitability analysis are also given under this section.

Table 13: Factors and Criteria for Commercial - Peshawar

x				
S. No	**Parameters**	**Classes (Meters) (Degree)**	**Weights** **1 = Not Suitable** **2 = Moderate** **3 = Most Suitable**	**Influence**
1	Primary Roads	11 - 70	1	25
		71 - 800	2	
		801 - 1600	3	
		Above 1600	3	
2	Secondary Roads	20 - 80	1	35
		81 - 900	3	
		901 - 1800	2	
		Above 1800	2	
3	Existing Commercial Bazar	0 - 600	3	25
		601 - 1200	2	
		1201 - 1800	2	
		Above 1800	1	
4	Land Cover	Built-Up	1	15
		Vacant	3	
		Vegetation	2	

Source: Devised by Consultants

7.7.3. LSA Criteria for Industry

The Industrial criteria has been made by using factors of planning development. The important factor is the proximal of land to road, community facilities and parks and playground. The table below shows the selected criteria for residential.

Due to industrial requirement of transportation such as trucks and loaders, the distance between 11 and 700 meters on the primary road is assigned a weightage of 3 (most suitable). Following that, the distance of 701 to 1400 is deemed moderately suitable due to its distance from primary roads. Similarly, over 1,401 are assigned a weight of 3 (not suitable) due to greater distances from the road, and at this distance, the majority of the area can be classified as open spaces. In the case of secondary roads, a similar method has been adopted. Area

between 6m to 650m are weighted as most suitable, whereas 551m to 1200m as moderately suitable and distance of 1,651 and above is categorized as not suitable.

In the case of existing industrial block, the proximal areas are given highest priority. Area within the distance of 500m are not suitable, followed by 501 to 1,000m with moderately suitable and 1,001 m and above as highly suitable. Remaining parameter for industry land use include water body and land cover. For waterbody, area under 50 m is given not suitable, followed by 51 – 500m under moderately suitable and area above 501m for most suitable. For Land cover, built up area is not suitable, vegetation is moderately suitable and vacant is highly suitable.

The factor and constraint maps for residential land suitability analysis are given below;

Table 14: LSA Criteria for Industry

Criteria For Industry				
S. No	Parameters	Classes (Meters) (Degree)	Weights 1 = Not Suitable 2 = Moderate 3 = Most Suitable	Influence
1	Primary Roads	11 - 700	3	15
		701 - 1400	2	
		1401 - 2100	1	
		Above 2100	1	
2	Secondary Roads	6 - 650	3	25
		551 - 1200	2	
		1201 - 1650	2	
		Above 1650	1	
3	Waterbodies	0 - 50	1	20
		51 - 500	2	
		501 - 1200	3	
		Above 1200	3	
4	Existing Industrial Block	0 - 500	1	25
		501 - 1000	2	
		1001 - 1500	3	
		Above 1500	3	
5	Land Cover	Built-Up	1	15
		Vacant	3	
		Vegetation	2	

Source: Devised by Consultants

7.8. GIS Tools

GIS Tools for multi-criteria decision analysis include:

7.8.1. Euclidean Distance

- Measures distance between set elements.
- Zero distance implies equivalence.
- Reclassification on a 1 to 7 scale (7 being most favorable, 1 least).

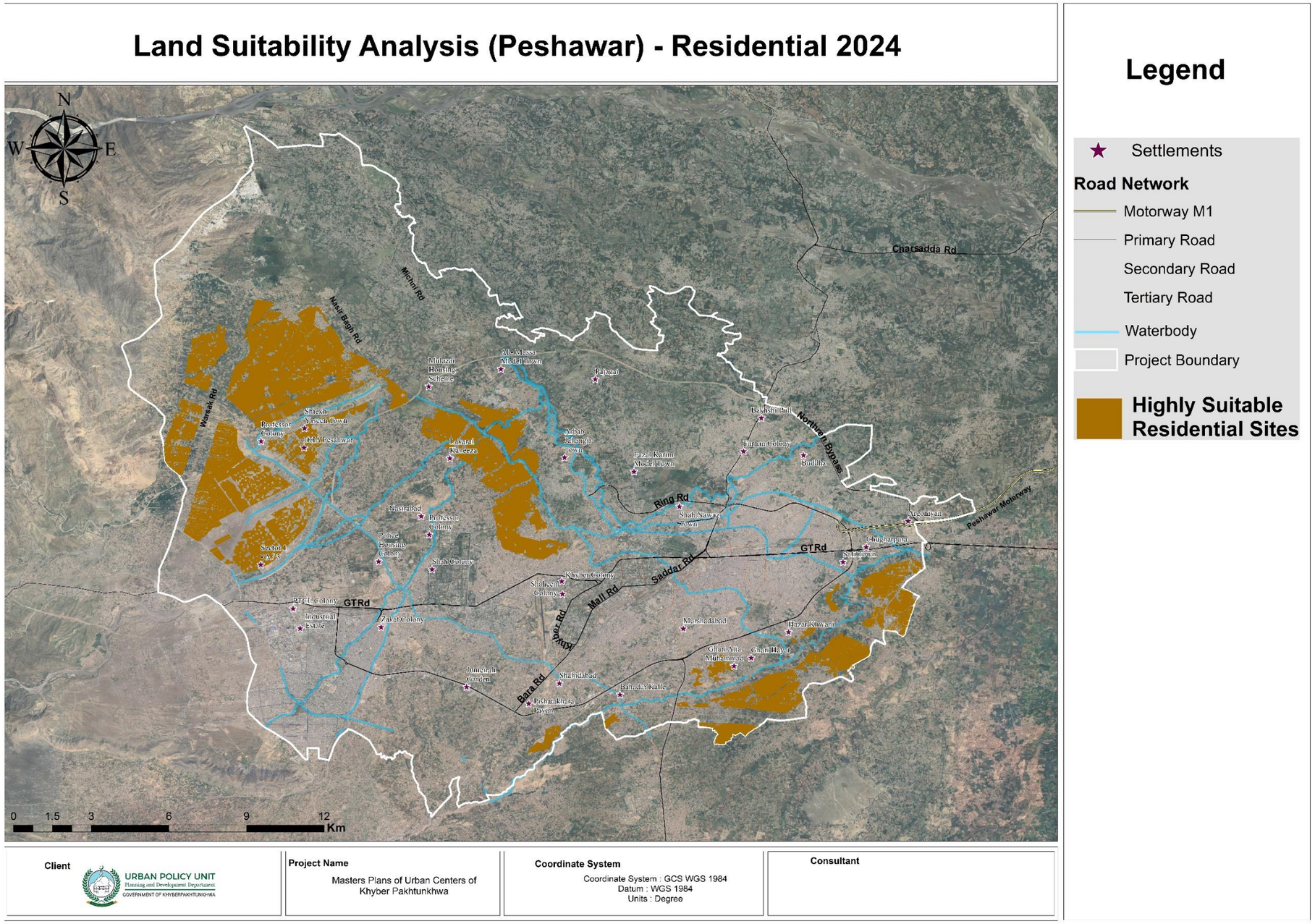
7.8.2. Reclassify:

- Adjusts Euclidean Distance scale.

7.8.3. Weighted Overlay:

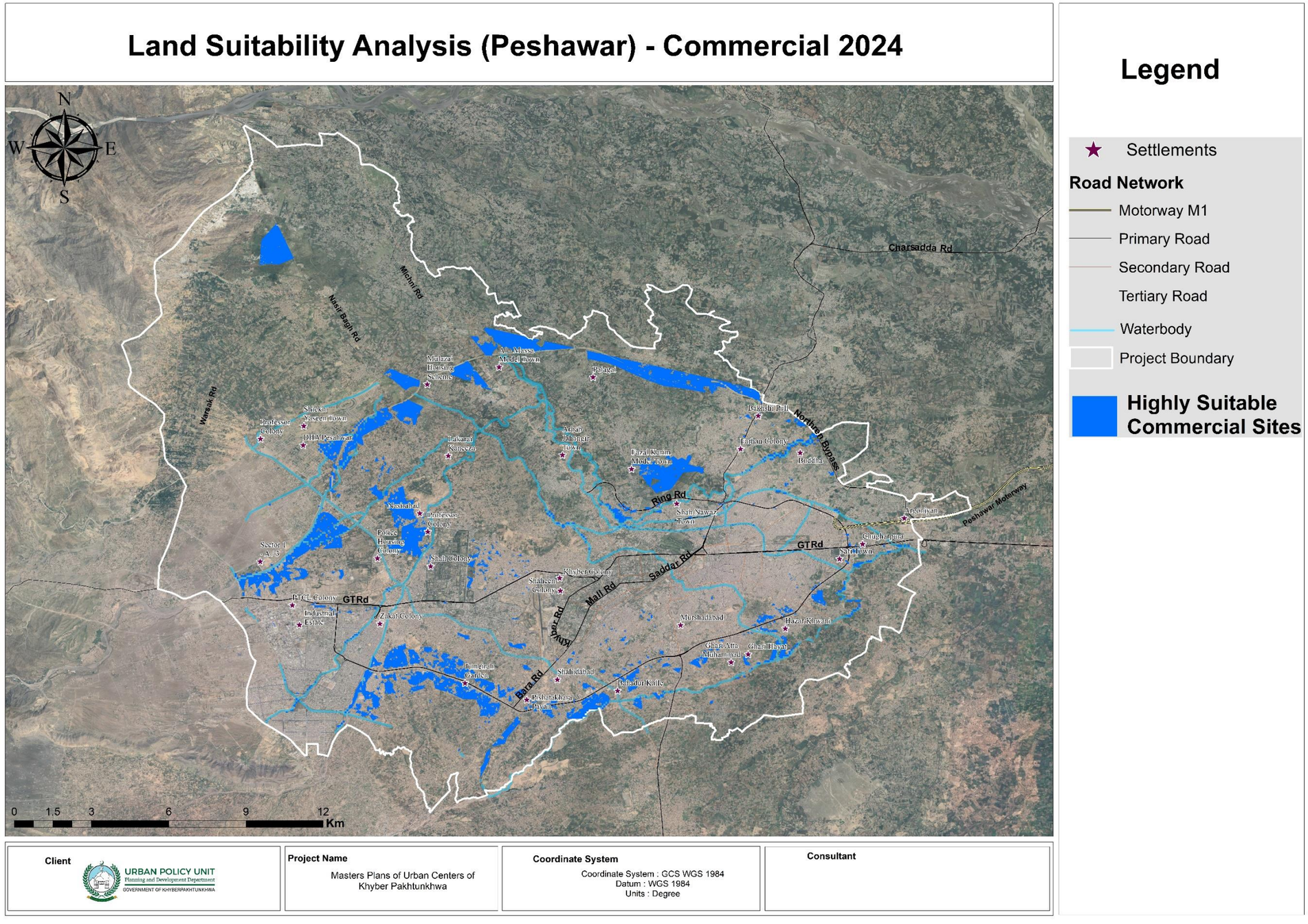
- Calculates multiple-criteria analysis.
- Involves raster datasets weighted based on factors and constraints.
  Options include browsing for datasets and defining factors (restricted).

Map 8: Land Suitability Analysis of Residential Land Use



Source: Devised by Consultants

Map 9: Land Suitability Analysis Commercial



Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System : GCS WGS 1984 Datum : WGS 1984 Units : Degree	

Legend

- Settlements

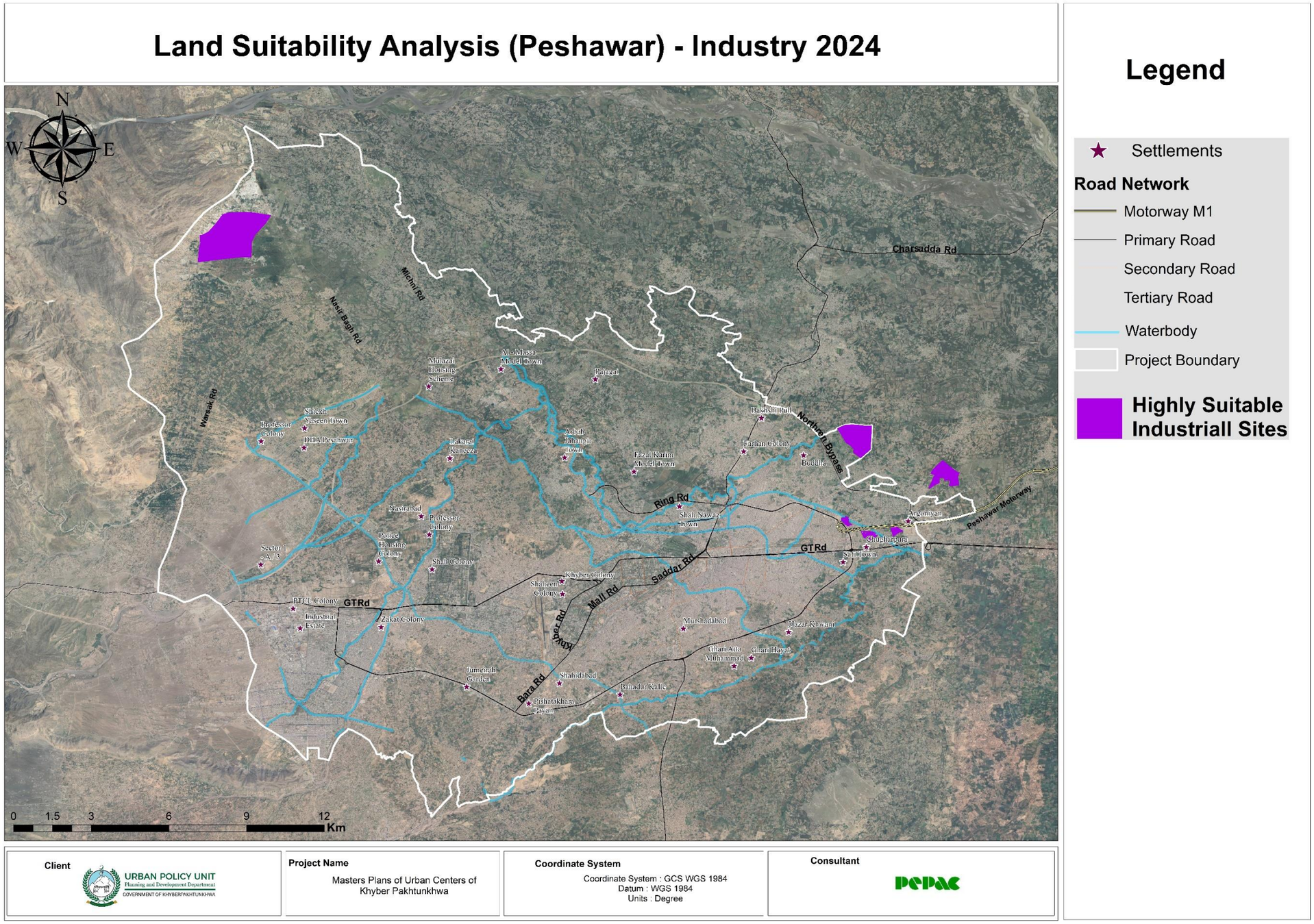
Road Network

- Motorway M1
- Primary Road
- Secondary Road
- Tertiary Road
- Waterbody
- Project Boundary

Highly Suitable Commercial Sites

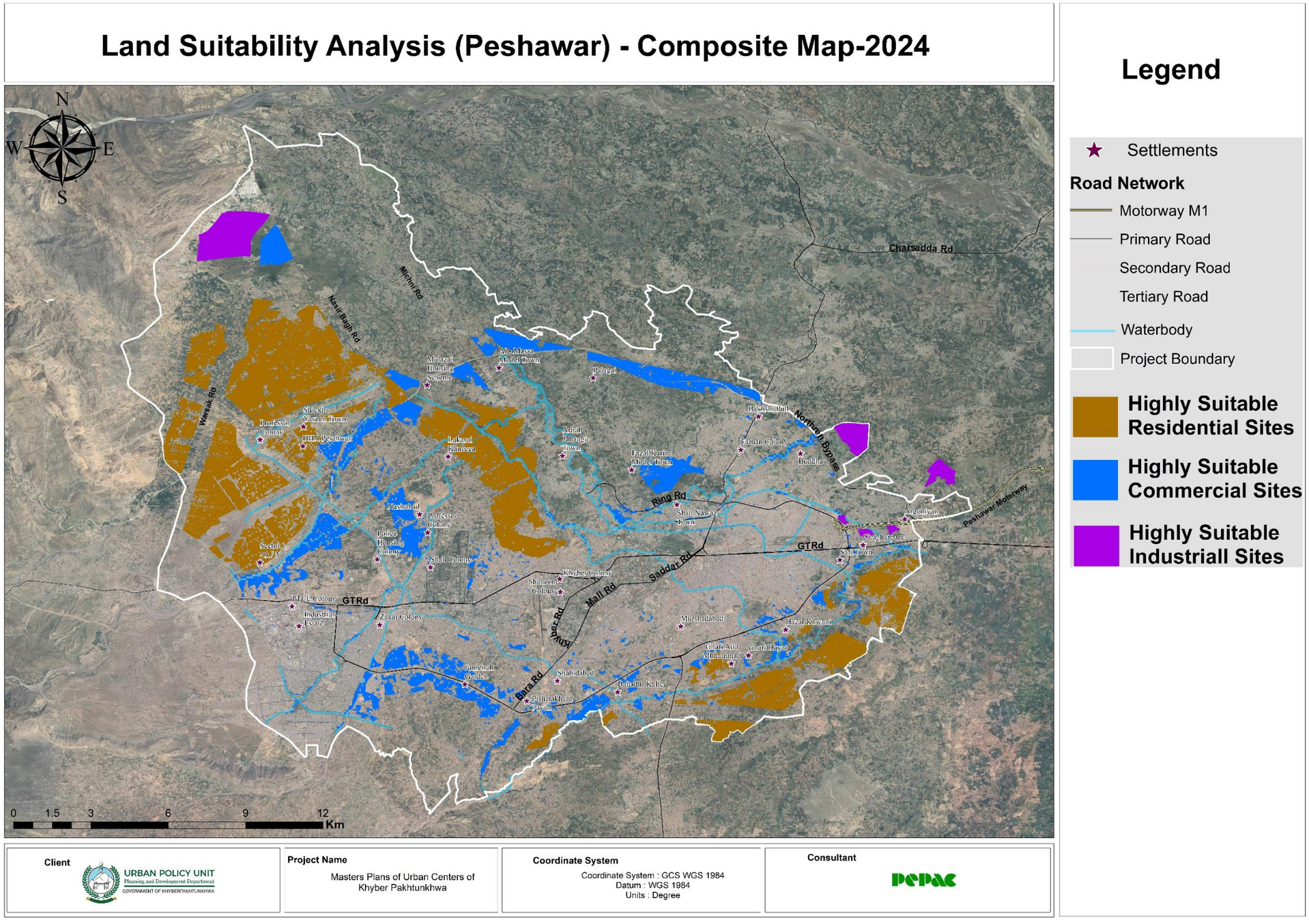
Source: Devised by Consultants

Map 10: Land Suitability Analysis for Industry



Source: Devised by Consultants

Map 11: Land Suitability Analysis – Composite Map



Source: Devised by Consultants

Chapter 8 – Master Plan Development Blueprint

8.1. Salient Features of the Proposed Master Plan

The purpose of the master plan is to fulfill the specific needs and goals of the area being planned, by typically addressing a wide range of topics related to land use, transportation, environmental protection, economic development, and community engagement. The Master Plan of Peshawar City 2042 will outline the area's current and future land uses, such as residential, commercial, industrial, and institutional. It will also identify areas for open space, parks, and other recreational amenities as per the current and future needs of the city. Following is the detail of the proposed master plan for Peshawar City 2042;

8.1.1. Residential/Housing

The proposed residential zones in the Peshawar Master Plan present a comprehensive and strategic solution to meet the city's housing demands through 2042. By leveraging housing supply from both the public and private real estate sectors, as well as infill development, the plan effectively accommodates the incremental population. For the remaining housing demand, the proposed zones are aligned with the Approved Provincial Land Use Plan of Peshawar (2019), ensuring that future growth is directed towards areas that support sustainable urban expansion.

The plan emphasizes land efficiency through a blend of compact development and sustainable growth, particularly through the Transit-Oriented Development (TOD) approach. This innovative strategy encourages high-density, mixed-use developments near public transport networks, promoting walkable, pedestrian-friendly communities that reduce the strain on infrastructure. A balanced combination of horizontal and vertical development—including multi-story housing—allows for optimal land use, providing ample housing while maintaining urban green spaces and other essential infrastructure.

8.1.2. Recreation/Open Spaces

The Proposed Recreation/Open Spaces Zone in Peshawar aims to enhance the quality of life for residents by expanding recreational and green areas significantly. The current recreational spaces span 839.90 acres, and the proposed plan envisions an increase to 951.76 acres by 2042. This includes the development of neighborhood-level parks designed to harmonize natural beauty with adventure activities, providing spaces for both relaxation and thrill-seeking. The zoning regulations allow for various land uses, such as amusement parks, youth hostels, urban forests, and botanical gardens, ensuring diverse recreational opportunities. With this expansion, Peshawar seeks to foster a healthier, more vibrant urban environment, balancing the city's rapid growth with the need for open, green spaces.

8.1.3. Commerce and Trade Zone

The proposed commercial zones for Peshawar's Master Plan cover a total of 5,126.73 acres, strategically planned to accommodate the city's future population growth and enhance its

commercial infrastructure. These zones are distributed across different types of development, including Proposed Commercial Zones (PLUP), Linear Commercial Development, and High-Density Mixed-Use Zones.

The Proposed Commercial Zones (PLUP), comprising 2,195.9 acres, are focused on creating concentrated commercial hubs along key roads such as Bari Road and Phandu Road. These zones are designed to integrate modern commercial activities with parking facilities to mitigate traffic congestion.

The Linear Commercial Development, covering 1,880.09 acres, aims to establish commercial corridors along primary and secondary roads, ensuring accessibility and a balanced distribution of commercial activities across the city.

Lastly, the High-Density Mixed-Use Zone, spanning 1,050.31 acres, promotes ground-floor commercial spaces with upper residential or office units. This mixed-use development concept is intended to foster economic vibrancy while addressing the city's need for commercial space, housing, and sustainable urban growth. Each commercial area will allocate 10% of its land for parking to ease traffic issues and reduce on-street parking challenges.

8.1.4. Agriculture Conservation Zone;

By keeping in mind, the Goals for Sustainable Agriculture development and promotion in Peshawar City, the following proposals have been considered;

i. Encouraging Conservation Practices and Tunnel Farming
ii. Promoting Integrated Pest Management
iii. Supporting Agroforestry
iv. Promoting Organic Agriculture
v. Supporting Local Food Systems
vi. Investing in Sustainable Agriculture Research and Education
vii. Encouraging Agro ecology

8.1.5. High Order Services Zone

The **High Order Central Facilities Zone** in the Peshawar Master Plan 2042 covers **847 acres**, divided into two zones with strategic access to the **BRT system** and the **proposed Ring Road**. This zone is designed to host vital civic and institutional functions, such as **government and administrative offices**, **specialized hospitals**, **IT universities**, and **technical colleges**. It will also feature **cultural amenities**, including **museums**, **theaters**, and **public parks** designed to be gender-inclusive, alongside **transportation hubs**, **libraries**, and **green spaces**. This zone aims to create a vibrant, well-connected urban hub, offering a blend of administrative, educational, healthcare, and recreational facilities to support Peshawar's growth and modern development.

8.1.6. Industrial Zones

The Industry Comprehensive Proposal for Peshawar highlights the city's evolving industrial landscape, which plays a critical role in its economic growth. Covering an existing industrial area of 843.85 acres, the city also hosts key economic zones like the Peshawar Industrial Estate, Hayatabad Economic Zone, and the Pak-Afghan Economic Zone. These zones are integral to boosting industrial activities, creating jobs, and enhancing regional trade, particularly through the strategic opportunities presented by the China-Pakistan Economic Corridor (CPEC). With a focus on expanding advanced industrial facilities, such as automation plants and heavy industrial setups, Peshawar is positioning itself as a hub for both local and foreign investment, which will contribute to the city's economic stability and growth over the coming decades. The zoning regulations emphasize appropriate land uses for light-medium and medium industrial activities, ensuring safe, sustainable, and efficient industrial development.

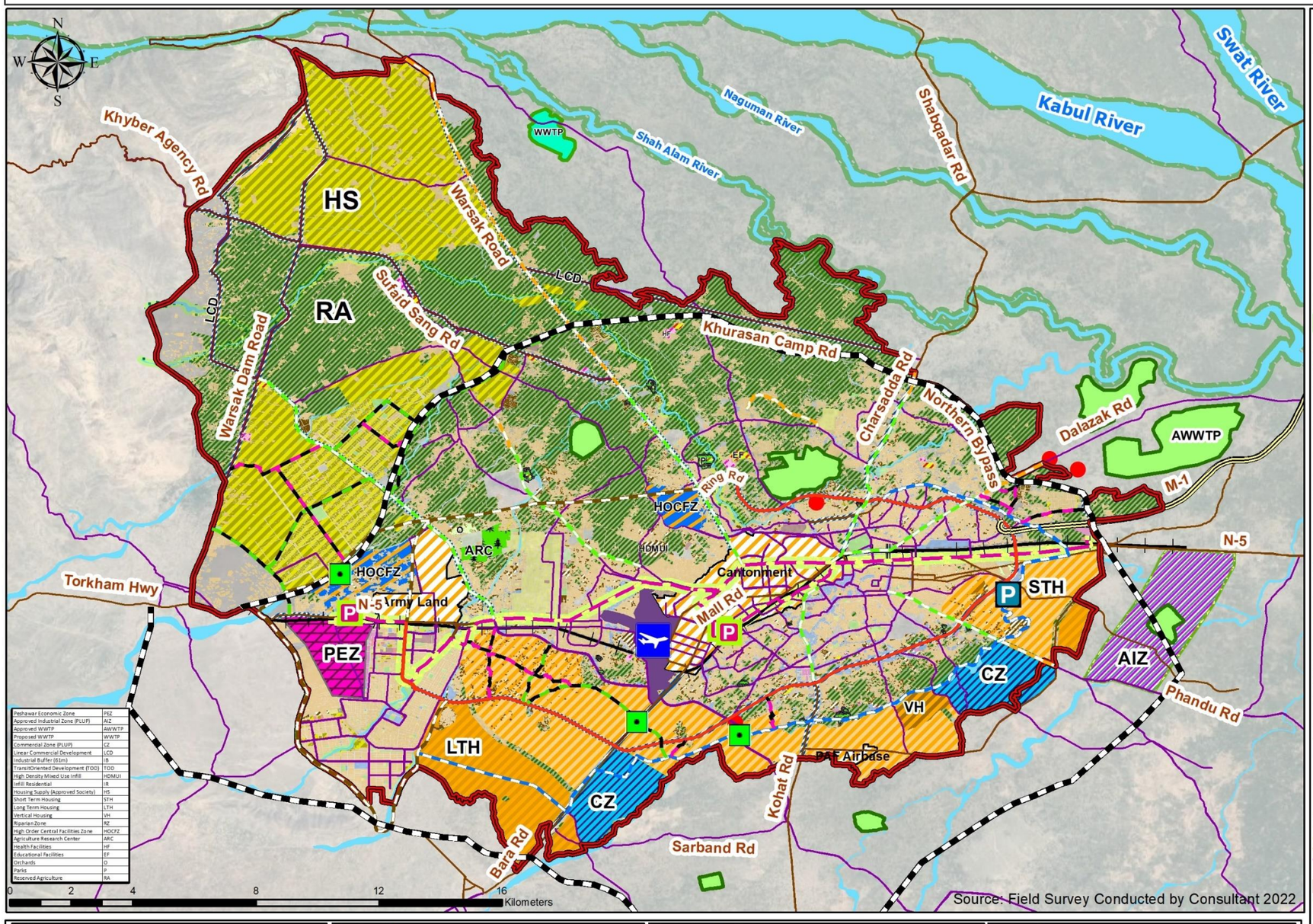
8.1.7. Social Infrastructure – Health and Education

The Master Plan for Peshawar proposes a comprehensive strategy to address healthcare needs by ensuring equitable access and sustainable infrastructure development. It includes the provision of 89.74 acres for neighborhood-level healthcare facilities, targeting underserved areas. The plan emphasizes expanding Basic Health Units (BHUs), dispensaries, and maternal and child healthcare centers, aiming to meet National Reference Manual (NRM) standards and WHO requirements for hospital beds. Zoning regulations are outlined to support health facilities, including hospitals, research centers, and support services, integrated with urban planning for better accessibility and future population growth.

The Master Plan for Peshawar proposes a significant expansion of educational facilities by designating 110.68 acres for new institutions to meet future demand. Emphasizing vertical development to optimize urban space, the plan focuses on creating accessible education zones with modern facilities, including schools, colleges, universities, research centers, and vocational institutions. The proposals aim to integrate education into the urban landscape while promoting land-use efficiency. Zoning regulations support the development of educational infrastructure, ensuring a balanced mix of educational, social, and community facilities to serve the growing population until 2042.

Map 12: Draft Master Plan of Peshawar City, 2042

Master Plan Peshawar City 2042



Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT Planning and Development Department GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Chapter 9: Housing/Residential Zone

9.1. Introduction

Housing has a significant impact on human behaviour since the social and physical environment affects not just how individuals develop the built-up environment but also how societies are created and behave. It also enables individuals or group of people to exercise their economic, social, and cultural rights, which leads to a broader understanding of the various facets of a neighbourhood, city, nation, or region. Given this significance, housing has continued to be the most important element of Peshawar's master planning. Different housing analyses, such as housing condition, backlog, trend, density, etc., have been conducted and analysed in Task B of the Master Plan of Peshawar City 2040.

Peshawar holds the status of the administrative centre for the province of KP. Given this status, it should portray a positive image of the organisational structure and provide economic, social, and cultural opportunities for its residents. However, the reality is quite different from this supposition. Peshawar has been home to various illegal housing and presents a substandard condition of utilities. Most of the housing units in Peshawar are made up of lintel and baked bricks/ stones but percentage of housing units have also been built from wood, mud and t-iron / girdar.

Further, most of the housing can also be categorised as unsafe due to the use of basic construction materials and an average house age of more than 20 years. Whereas the adequacy of the housing, and occupancy rate of the households show a better situation, but the unavailability of separate kitchen (21.48%) and bathroom (7.33%) portrays the opposite situation. Concerning access to amenities, most of the families of Peshawar are not satisfied, or in most cases, do not have proper access to municipal utilities (electricity & sui gas) and amenities.

9.2. Existing Housing Situation

The evolving sociological dynamics in Peshawar's urban areas are intensifying housing demands. The shift from traditional joint family structures to nuclear families is accelerating, exacerbating the need for housing. Individuals without adequate shelter often resort to makeshift dwellings on the streets, which poses significant risks, including fatal accidents.

The Planning Commission of Pakistan reports that approximately 300,000 housing units are constructed annually, predominantly in urban areas. However, this number falls significantly short of the actual demand, leading to a growing backlog in large urban centers that are already overwhelmed by migration driven by the pursuit of better healthcare, education, employment, and security. Consequently, informal settlements such as katchi abadis and shantytowns have emerged to accommodate those excluded from formal housing options.

In Peshawar, the core city has witnessed a proliferation of informal multi-story structures that pose severe risks, particularly in the event of seismic activity or heavy rains. The urban land

market has become highly commoditized, with prices soaring to levels that make housing unaffordable for low- and middle-income residents. This has resulted in widespread encroachment on public land, further constraining the availability of affordable housing. Additionally, political interests often overshadow the pressing need for equitable land distribution, leading to a prioritization of real estate investments for middle- and upper-income groups.

Real estate development has become a lucrative investment avenue, with various sectors such as design, construction, brokerage, marketing, and financial services involved. However, the ultra-high cost of these schemes renders them inaccessible to the urban and rural poor.

Katchi abadis, or squatter settlements, are informal residential areas established on public land. The growth of these settlements has been significant, prompting the government to implement policies for their regularization and improvement. The Khyber Pakhtunkhwa Katchi Abadis Act of 1996 outlines provisions for managing these settlements in Peshawar and beyond. Despite government announcements regarding the regularization of settlements on railway lands, local officials remain skeptical about the implementation due to administrative and legal hurdles.

Recently, the National Accountability Bureau (NAB) in Khyber Pakhtunkhwa investigated a case involving the alleged embezzlement of over Rs. 18 million by a Provincial Housing Authority Land Acquisition Collector and his associate, highlighting the ongoing challenges in managing and allocating land for housing schemes.

According to the 2017 census report, Peshawar City had a total population of 1,899,117 people who were housed in 226,046 units, compared to the years 1998 and 1981, when there were 914,076 people in 110,444 housing units and 506,896 people in 72,013 household units, respectively. Following are the differences in population, household sizes, and household units between three successive censuses:

Table 15: Demographic Assessment Three Consecutive Censuses – Urban Peshawar

Sr. #	Description	1981	1998	2017
1	Population	506,896	914,076	1,893,344
2	Intercensal Increase in Population (%)	80.32		107.13
3	Household Units (HU)	72,013	110,444	226,046
4	Intercensal Increase in HUs (%)	65.96		46.91
5	Household Size (HS)	7.2	8.2	8.09
6	Intercensal Increase in HS (%)	13.88		-0.01

Source: District Census Report of Peshawar for 1981, 1998 and 2017, PBS

Comparison between the census shows that the although the population between 1981-1998 and 1998-2017 had increased with respect to 80.32% and 107.13% respectively, the housing units had not followed the same pattern. In year 1981-1998, the increase in household units were 65.96% for 80% increase in population. In parallel to this, in 1998-2017, the population

had increased with enormous percentage of 107.83 while the housing units increased by only 46.91%. These stats don't only depict fluctuation of the population, housing unit and household size but highlights major disparity that could exist in the city to accommodate this huge population.

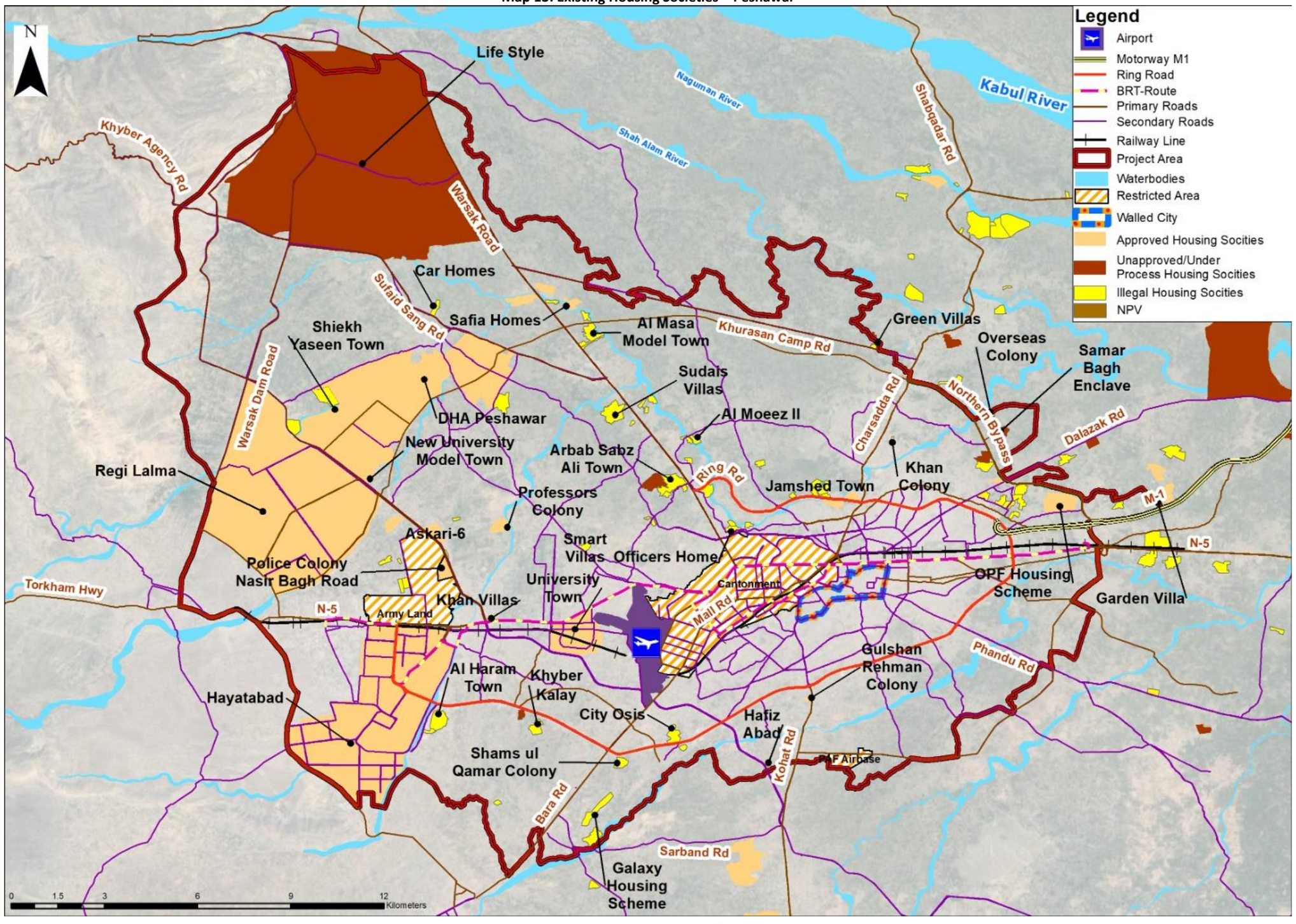
9.3. Existing Housing Societies

Peshawar's urban landscape includes a mix of approved and unapproved housing societies, reflecting the city's rapid urbanization and growing demand for residential developments. Currently, there are 24 approved housing societies in Peshawar, of which 19 are located within the study area boundary, covering a total area of 77.78 km². These approved societies adhere to the city's planning and development regulations, ensuring proper infrastructure, amenities, and legal compliance. They play a significant role in providing planned housing options for the city's residents, contributing to the organized expansion of urban areas.

In contrast, the city also faces challenges with 110 unapproved housing societies, 69 of which fall within the study area, occupying a collective area of 5.65 km². These unapproved societies lack proper authorization and may not meet the city's urban planning standards, often leading to issues like inadequate infrastructure, poor service delivery, and unregulated land use.

The presence of such a large number of unapproved societies highlights the need for stronger enforcement of planning regulations and the regularization of these areas to ensure sustainable urban growth.

Map 13: Existing Housing Societies – Peshawar



Source: Secondary Data from TMAs

9.4. Housing Shortage & Need Assessment

Housing isn't just important for security and solace but is needed for society to thrive and maintain a satisfactory quality of living. In Pakistan, millions of people still struggle to get a roof over their head due to augmented land prices in parallel to limited resources and mismanagement on behalf of authorities. Approximately, Pakistan has housing shortage of 11 to 12 million housing units which can be observed nation-wide.[15] This abysmal state depicts the poor social security but the poor quality of life for the people.

depicts the poor social security but the poor quality of life for the people.

To access the housing shortage of Peshawar, the existing population of 2022 along with its housing units have been calculated from projection and land use classification, respectively. According to PBS, Peshawar MC has a population of 1,889,274 in 226,064 housing units while the recorded household size is of 8.09 persons.[16] However, the housing projections have been carried out on the study area which is calculated to had population of 2,868,714 in 2017, out of which 789,075 people resided in village councils (rural areas) of the study area.

The average household size of rural Peshawar given in the census of 2017 is 8.74[17] which suggested that 789,075 people had been residing in 90,282 housing units (estimated). Therefore, collectively, the total housing units in 2017 in the study area come to be 351,217 and the average household size of the study area (using average of household size of MC Peshawar and Rural Peshawar) come to be 7.97. For the purpose of the housing projections, however, as the entire study area is considered to be urban, the average household size used is of MC Peshawar i.e., 8.27.

The projected population for 2022 shows an increase of approximately 519,882 people in 5 years, making the total population to be of 3,388,596 people with total housing units of 414,080 with the projected household size of 8.27. Calculations of housing backlog for Peshawar city is as follows:

Table 16: Housing Backlog – Urban Peshawar

Housing Backlog							
Year	**Population**	**Household Size**	**Required Housing Units**	**Existing Housing Units**	**Backlogs**	**Replacement Demand**	**Total Requirement**
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
			B/C	**Calculated by Consultant**	**D-E**	**E*3.1%**	**F+G**

[15] Akhtar, N., Habib, Habib, R.I., Madni, A. Naya Pakistan Housing Program: An Analytical Study of Mortgage-Backed Security Model and Legal Framework for Low-Cost Accessible Housing Scheme in Pakistan (2022)
[16] Area, Population by Sex, Sex Ratio, Population Density, Urban Proportion, Household Size and Annual Growth Rate, Table 1, Census 2017, PBS
[17] ibid

2017	2,868,714	7.97	359,939	351,217	8,722		8,722
2022	3,388,596	8.27	409,746	414,080	(4,335)	12,836	8,502

Source: Calculated by Consultant through field Survey

The calculation for the required housing units to accommodate the total population shows there is no current housing backlog in the Peshawar city. In regard to the replacement demand of Peshawar, the dilapidating units has been identified and accounted for in the calculations of replacement demand. The existing housing units in the city vary from good to worse in terms of their conditions and infrastructure. Although most of the housing units were built with lintel and baked bricks, basic construction material such as wood, unbaked bricks/mud and t-iron/girder, is also used in a portion of the housing units. While some portion of the housing units were not connected to proper drains or paved roads. Thus, these housing units, due to the use of basic construction material are, needed to be replaced with resilient and durable construction materials such as lintel and baked bricks. Most of these dilapidating housing units must fall under the slums area of Peshawar. These housing units will account for replacement demand in the Peshawar study area.

9.5. Housing Supply

To evaluate the existing and potential housing supply for the city of Peshawar, three distinct scenarios have been formulated. Each scenario offers a different perspective on the housing landscape within the study area, providing a comprehensive assessment of the current and projected housing availability.

i. **Scenario I:** Housing Stock from Approved/Planned Housing Societies within the Study Area
ii. **Scenario II:** Housing Stock from Infill Development
iii. **Scenario III:** Impact from the Mega Housing Societies adjacent to the Study Area

9.1.1. Scenario I: Housing Stock from Real Estate Sector (Approved Housing Societies)

The housing supply analysis for Peshawar, based on data from the Tehsil Municipal Administration, provides a detailed examination of residential offerings from various approved housing societies. This analysis encompasses both public sector initiatives and private sector developments.

The primary public sector housing schemes in Peshawar include Hayatabad, and Regi Model Town. Hayatabad spans 3,300 acres and offers 22,500 plots. Regi Model Town, covering 12,350 acres, provides 26,900 plots of varying sizes, though it remains uninhabited as of the current assessment[18].

In the private sector, approved housing schemes have been identified: Life Style Housing Scheme, Professors Model Town, Shaheen Housing Complex, Sheikh Yaseen Town, New University Model Town, and Zintara Residencies. These schemes collectively encompass a

[18] Provincial Land Use Plan of District Peshawar

substantial area of 19,220.87 acres[19]. An analysis conducted by the consultant reveals that 12,521.21 acres of this area are currently vacant.

Following the Private Housing Scheme Rules of Khyber Pakhtunkhwa (KPK), 50% of the vacant land within each housing scheme is allocated for residential use. Therefore, the residential land available within these private housing societies totals 6,260.61 acres. The calculation of potential housing units is based on this residential land area, utilizing an average plot size of 5 Marlas as per primary data collected.

The number of housing units is estimated by dividing the residential land area by the average plot size. This calculation yields the tentative number of housing units that can be accommodated within these schemes. To further refine this analysis, the projected average household size for the year 2042, estimated at 8.12 persons per household, is applied. This approach allows for an estimation of the potential population that these housing societies could accommodate.

Following table shows the detailed calculations of housing stock from the approved housing societies;

Table 17: Housing Supply from Approved Housing Societies within the Study Area Boundary

Housing Supply from Approved Housing Societies within the Study Area Boundary		
Total Area of Approved Housing Societies	19,220.87 Acres	*Total Area of Approved Housing Societies within Study Area Boundary*
Vacant Area within Approved Housing Societies	12,521.21 Acres	*Vacant Land Within Approved Housing Societies in Study Area Boundary*
Allocated Residential Area (50%)	6,261 Acres	***50%** Area Allocated to Residential as per PHS rules.*
Area in Marla's	1,001,697 Marla	-
Housing Units (Supply)	200,339 Units	*By using Average Plot size of **5 Marla**, based on Primary Data Analysis*
Population to be accommodated in Approved Housing Societies	1,626,756 People	*Using Average Household Size: **8.12***

Source: Devised by Consultant

[19] Ibid

The housing supply analysis from approved housing societies in Peshawar underscores a substantial contribution, with a total of 200,339 residential units capable of accommodating a population of 1,626,756 individuals.

9.1.2. Scenario II: Housing Stock from Infill Development

The second housing supply scenario focuses on infill development within Peshawar, assessing the capacity of vacant land parcels within Neighborhood Councils (NCs) and unapproved housing societies to contribute to the city's housing supply. Infill development refers to the utilization of vacant or underused land in already developed areas, helping to optimize urban land use and reduce urban sprawl. This scenario analyzes two categories: vacant land parcels over 1 acre within NCs and land within unapproved housing societies or parcels below 1 acre.

9.1.2.1. Vacant Land Parcels within NCs (Above 1 Acre)

The analysis identified 495.77 acres of vacant land within NCs, comprising parcels larger than 1 acre. The total area amounts to 79,323 Marlas, which, using an average plot size of 5 Marlas, can supply an estimated 47,494 housing units. These housing units have the potential to accommodate approximately 386,463 people, based on the projected household size of 8.12 persons per household for Peshawar by 2042.

This analysis indicates a significant capacity for housing supply within these large vacant land parcels, offering a feasible opportunity for urban densification within the city. Utilizing such available land can efficiently address the growing housing demand, reduce land wastage, and support sustainable urban growth by minimizing the need for outward expansion.

9.1.2.2. Infill Development from Unapproved Housing Societies and Vacant Parcels Below 1 Acre

The second component of the infill development analysis examines the potential of unapproved housing societies and vacant land parcels smaller than 1 acre, amounting to 1,050.31 acres. Following urban planning guidelines, 75% of this land, or 787.73 acres, is allocated for residential purposes. This residential land corresponds to 126,037 Marlas.

Based on an average plot size of 5 Marlas, the area can supply approximately 25,207 housing units. These housing units could accommodate a projected population of 204,684 people, further adding to the housing stock within the city.

9.1.2.3. Total Housing Supply from Infill Development

When combining the two categories of infill development—large vacant parcels within NCs and smaller parcels from unapproved societies—the total housing supply from infill amounts to 72,801 units. This capacity has the potential to accommodate 591,147 people.

Table 18: Housing Supply from Infill Area

Housing Supply from Infill Area		
Vacant Land Parcels within NCs having more than 1 acre area	495.77 Acres	*Vacant Land Parcels above 1 Acre within NCs*
Marla's	79,323 Marla	
Housing Units (Supply)	47,494 Units	Average Plot Size: 5 Marla
Population to be accommodated	386,463 People	*Average Household Size: 8.12*
Infill from Unapproved Housing Societies and Vacant Below 1 acre	1,050.31 Acres	*Vacant area from Unapproved Housing Societies and Vacant Below 1 acre within NCs*
Allocated Percentage for Residential Infill	787.73 Acres	*75% Allocated for Residential Purposes*
Area in Marla	126,037 Marla	
Housing Units (Supply) (5 Marla Average Plot Size)	25,207 Units	*Average plot size 5 Marla, based on primary data analysis*
Population to be accommodated in Infill Housing Supply	204,684 People	*Average Household Size: 8.12*
Total Housing Supply from Infill	72,801 Units	*Total Housing Supply and Population to be accommodated in Infill Area of Peshawar*
Total Population to be accommodated in Infill	591,147 People	

Source: Devised by Consultant

The infill development scenario is a critical strategy for addressing Peshawar's growing housing demand. By focusing on the utilization of vacant land within existing urban boundaries, this scenario provides a sustainable approach to increasing housing supply without contributing to urban sprawl. Infill development helps maintain the city's compactness, optimizing land use, and infrastructure while also reducing the strain on resources.

Moreover, by targeting both large and small land parcels, this approach ensures that diverse opportunities for residential development are explored, allowing for flexibility in planning and implementation. These infill areas can be efficiently integrated into the existing urban fabric, offering residents proximity to essential services and reducing transportation costs.

This approach also contributes to a more sustainable urban future, as it reduces the pressure on peripheral areas, preserves valuable agricultural land, and minimizes environmental degradation caused by urban expansion. Infill development, if well-planned, can foster vibrant, well-connected urban communities, offering a balanced response to Peshawar's housing challenges.

9.1.3. Cumulative Housing Supply From S1 And S2

Total Supply (Housing Units)	**273,141 Units**
Total Population to be accommodated	**2,217,903 People**

9.6. Future Demand Estimation

Naturally, the demand for housing will increase accordingly with the increased population of Peshawar city. From the year 2022 to 2042, the population of Peshawar is likely to increase by approximately 2.5 million people. This growth will ultimately demand a higher number of housing units in the study area.

While, for the calculation of household size, the national and global trend will be followed; the household size of urban areas, in this case Peshawar, will likely to be subjected to decline owing to increase in education, desire to improve quality of life and preference for nuclear households etc. In par with these reasoning, the past trend of declining household size has been observed and calculated for each year. The projected population in parallel to the required housing and household size in Peshawar city is as follows;

The future housing demand analysis for Peshawar aims to assess the city's capacity to meet its growing population's residential needs by the year 2042. Using population projections and housing supply estimates, the analysis highlights both the total housing requirement and the shortfall in supply, outlining critical gaps that must be addressed through strategic urban planning.

Table 19: Future Demand Estimation

Total Requirement till 2042	**A**	313,886 Units
Total Population to be accommodation till 2042	**B**	2,548,344 People
Demand fulfilled by Housing Supply	**C**	273,141 Units
Incremental Population Accommodated in Housing Supply	**D**	2,217,903 People
Leftover Demand (Housing Units)	**A-C**	40,746 Units
Leftover Population to be Accommodated by 2042	**B-D**	330,442 People

Source: Devised by Consultant

By 2042, Peshawar's total housing demand is estimated at 313,886 units. This demand arises from the projected population growth in the city, which anticipates a total of 2,548,344 people needing accommodation. These projections reflect the significant urban expansion that will take place in the coming decades due to natural population growth, urban migration, and the ongoing breakdown of extended family structures into nuclear families.

Current estimates suggest that Peshawar's available housing supply, encompassing approved housing societies and infill development (as analyzed in Scenarios I and II), will provide **273,141 housing units** by 2042. This supply has the potential to accommodate approximately **2,217,903 people**.

The bulk of this supply comes from formally approved housing societies and planned infill developments, offering a balanced mix of housing options. However, despite significant efforts to enhance housing capacity, the city's future housing supply still falls short of its total requirement.

The analysis reveals that despite the substantial housing stock, there remains a notable **leftover demand of 40,746 units** that must still be addressed to meet the projected requirement by 2042. This shortfall represents a housing deficit that will leave approximately **330,442 people** without proper accommodation if no further developments or interventions are made.

9.6.1. Area Requirement

To accommodate the projected housing demand for **330,442 people** (leftover population) by the year 2042, a total of **2,113.2 acres** will be required for future residential development. The planning and design of this residential area incorporate both **horizontal** and **vertical development** strategies, optimizing land use while ensuring sufficient housing capacity.

Approximately **70%** of the required area will be designated for horizontal development, using a mix of plot sizes, including **4, 5, 7, 10, and 20 Marlas**. This approach ensures flexibility in catering to diverse housing preferences and income groups, while also addressing the cultural preference for private land ownership and individual housing units.

Table 20: Area Requirement for Horizontal Development (2022-2042)

Single Storey Units	Percentage	Population	Housing Units	Area Required (Marla)	Area into Acres	Area Required for Allied Uses	Total Area Required
	F	F1	F2	I	I1	I2	J
		Pop*F	HU*F	(F2/H)*A	I*0.00625001	I1 *0.45	
4 Marla	20%	66,088	8,149	32,597	203.7	91.7	295.4

Single Storey Units	Percentage	Population	Housing Units	Area Required (Marla)	Area into Acres	Area Required for Allied Uses	Total Area Required
	F	F1	F2	I	I1	I2	J
		Pop*F	HU*F	(F2/H)*A	I*0.00625001	I1 *0.45	
5 Marla	20%	66,088	8,149	40,746	254.7	114.6	369.3
7 Marla	8%	26,435	3,260	22,818	142.6	64.2	206.8
10 Marla	15%	49,566	6,112	61,118	382.0	171.9	553.9
1 Kanal	7%	23,131	2,852	57044	356.5	160.4	517.0
Total	70%	231,309	28,522	214,322	1,340	603	1,942

Source: Devised by Consultant

The above table depicts that, for horizontal development 1.942 acres of land is required to cater leftover incremental population over the next 20 years. Furthermore, To optimize land use and address the growing housing demand in a more space-constrained environment, **30%** of the total residential area will be allocated for **vertical (G+3) development**, which includes multi-storey residential buildings with **Ground + 3 floors**. The calculations of apartments for vertical development have been explained in the following table;

Table 21: Calculation of Apartments for Vertical Development

Apartment Type	Size of Apartment (sq. ft)	Size of Apartment (Marla)	Units each floor	Area of Each Floor (Sq ft)	Area of Each Floor (Marla)	Additional area for Mandatory spaces	Total Area of Each apartment Building (Marla)
	A	A1	B	C	C1	D	E
		A*0.00367309		B*A	C*0.00367309	C1*0.4	C1+D
1 bedroom Apartment	1,000	3.7	4	4,000	14.7	5.9	20.6
2-bedroom Apartment	1,200	4.4	4	4,800	17.6	7.1	24.7
3 Bedroom Apartment	1,600	5.9	4	6,400	23.5	9.4	32.9

Source: Devised by Consultant

Using the above-mentioned criteria the area requirement for vertical development has been calculated and mentioned below in the table;

Table 22: Area Requirement for Vertical Development

Apartment Type	Percentage	Population	Housing Units	Number of Storeys	Housing units Accommodated in one apartment building	Area Required (Marla)	Area into Acres	Area Required for Allied Uses	Total Area Required
	F	F1	F2	G	H	I	I1	I2	J
		Pop*F	HU*F		B*G	(F2/H)*A	I*0.00625001	I1 *0.45	
1 bedroom Apartment	10%	33,044	4,074	4	16	5,238	32.7	14.7	47.5
2-bedroom Apartment	15%	49,566	6,111	4	16	9,429	58.9	26.5	85.4
3 Bedroom Apartment	5%	16,522	2,037	4	16	4,191	26.2	11.8	38.0
Total	30%	99133	12,224			18,857	117.86	53	171

Source: Devised by Consultant

9.7. Proposed Residential Zones

The proposed residential zones in the Peshawar Master Plan are based on a comprehensive analysis of housing supply and demand, incorporating population projections and land availability. Following the detailed housing supply analysis, it was determined that an additional **2,113.2 acres** will be required to accommodate the leftover population by 2042. To address this need, the proposed residential zones align with the **Provincial Land Use Plan of Peshawar (2019)**, ensuring that future development is both sustainable and responsive to the city's growth needs.

9.7.1. Strategic Location of Proposed Zones

The proposed residential zones are strategically located around the existing urban area, with the **primary thrust of future development** directed towards the **south along Indus Road** and the **south-east**. These locations have been identified based on several key factors:

1. **Proximity to Existing Urban Infrastructure**: By situating future housing developments adjacent to the existing urban area, infrastructure development costs are minimized, as new neighborhoods can leverage existing roads, utilities, and public services. This proximity ensures seamless integration of new residential areas into the city's urban fabric, promoting efficient use of resources.

2. **Infill Development Potential**: A significant portion of future housing will also come from infill development within vacant land pockets and unutilized areas in existing housing schemes. This approach maximizes land use efficiency within the city, curbing urban sprawl and promoting densification in areas that are already served by public infrastructure.

3. **Balance Between Horizontal and Vertical Development**: While the majority of the land is earmarked for horizontal expansion, particularly in the southern and southeastern zones, there is a dedicated effort to integrate vertical development through the Transit-Oriented Development (TOD) approach. This strategy focuses on mixed-use, walkable communities centered around public transport hubs, particularly along the Bus Rapid Transit (BRT) route in Peshawar.

9.7.2. Vertical Development and TOD Approach

One of the key aspects of the proposed housing strategy is the promotion of vertical development, especially through the Transit-Oriented Development (TOD) approach. This strategy is crucial for managing the city's growing population while reducing reliance on horizontal land expansion. The TOD approach promotes:

- **Compact, Dense Development**: By encouraging high-rise apartment buildings in areas around public transportation hubs, particularly the BRT route, the TOD model ensures that residential zones are developed in a compact manner, reducing land consumption while increasing housing density.
- **Sustainability and Livability**: The TOD approach fosters sustainable urban living by creating pedestrian-friendly, mixed-use environments where residents have easy access to public transportation, reducing traffic congestion and promoting a low-carbon lifestyle.
- **Efficient Land Use**: Vertical development allows for more efficient land use, accommodating more residents in smaller areas, and thus preserving valuable land for other uses, such as public spaces and green belts.

9.7.3. Land Use Strategy

The Provincial Land Use Plan for Peshawar designates 11,768.43 acres of residential zones within the study area boundary of the Peshawar City Master Plan. These zones have been selected after a careful assessment of land suitability, availability, and proximity to key urban centers. The rationale for prioritizing these zones includes:

- **Maximizing Urban Efficiency**: The proposed zones capitalize on vacant and underutilized land near the city's core, preventing excessive urban expansion into peripheral areas. This strategy ensures that residential growth is managed efficiently without burdening existing infrastructure or leading to unsustainable sprawl.

- **Adherence to Regulatory Framework**: The proposed residential zones comply with the land use guidelines and zoning regulations established in the Provincial Land Use Plan, ensuring that all developments are in line with regional policies and the city’s long-term development goals.

Area of PLUP Approved Zones falling inside the Boundary	
Vertical Housing	336.55 Acres

Short Term Housing	8,589.94 Acres
Long Term Housing	2,841.94 Acres
Total Area	***11,768.43 Acres***

The focus on planned intervention and compact development ensures that future residential growth in Peshawar is sustainable, equitable, and responsive to the city's needs. The proposed zones strike a balance between expanding residential areas and ensuring that this expansion occurs in a controlled and well-planned manner. By emphasizing densification, the Master Plan reduces the need for excessive land consumption, ensuring that Peshawar grows vertically and compactly rather than sprawling outward.

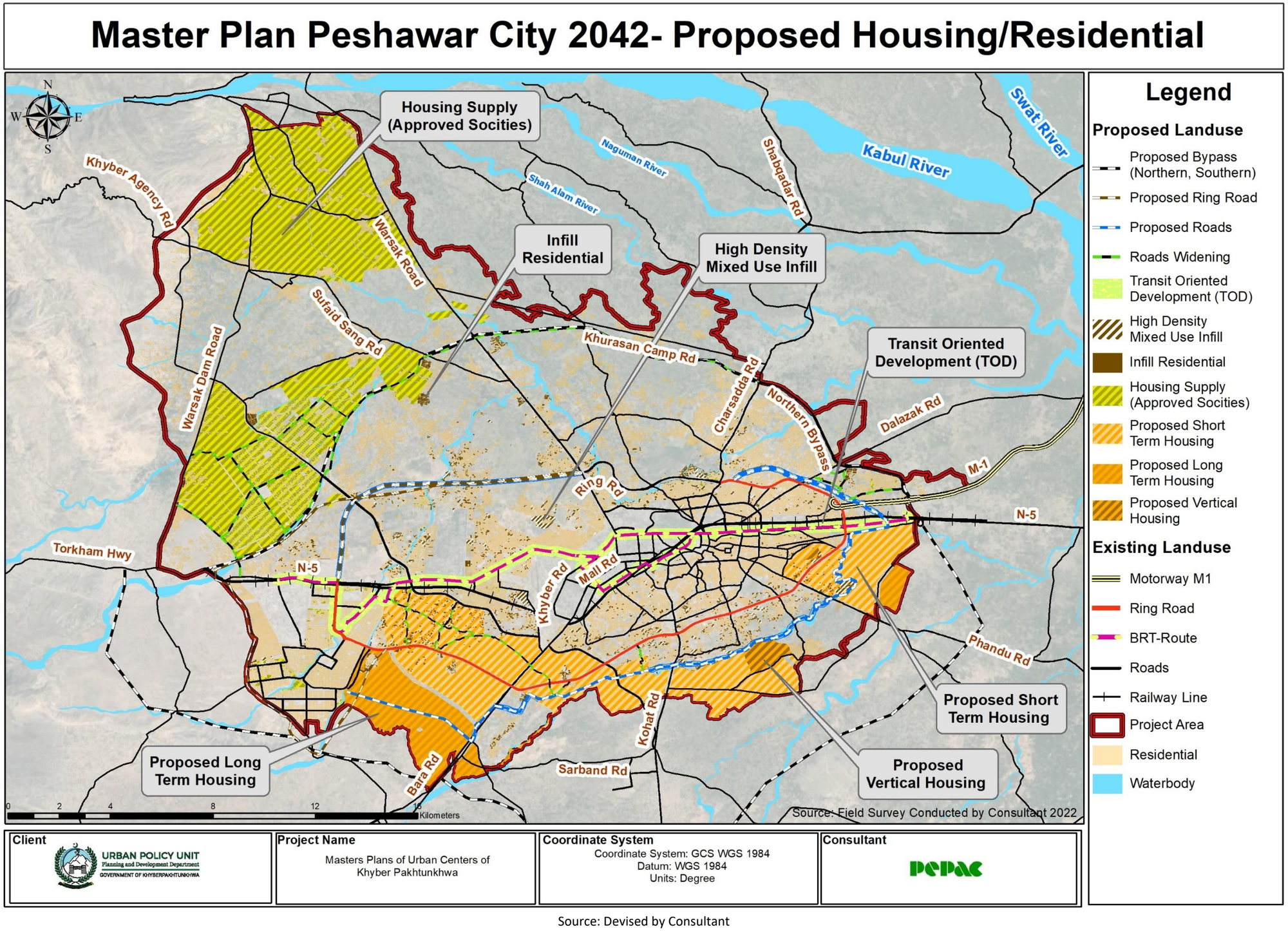
9.8. Zoning Regulations for Housing/Residential

Table 23: Zoning Regulations for Housing/Residential - Peshawar

Land use Zone	Permitted Land Uses	Permissible Land Uses
Low Density Residential	• Detached/semidetached dwellings • Mosques • Primary/High Schools • Clinics/Dispensaries • Social/Cultural Institutions • Local Shopping Areas/Retail Shops • Offices of Professionals with adequate parking facilities • Parks and Playgrounds • Local Recreational Uses • Non-commercial vegetable gardens and nurseries	• Commercial Offices and Service • Shops of Local Character • Raising of poultry for non-commercial purposes • Petrol pump, gas filling station. • Taxi/rickshaw stand
Medium Density Residential	• Apartment Buildings / Multi-family • dwellings • Colleges and Research Institutions • Hostels, Guest Houses • Offices of TMAs/other tiers of Local • Govt.	• All uses permissible on appeal in low-density residential zone. • Restaurants and hotels Hospitals • Petrol and Gas filling stations
High Density Residential (Apartment Complex)	• Apartments • Public Utilities and Buildings • Commercial on lower ground/basement • Recreational Uses • Taxi and Rickshaw Stands	• Indoor sports facility • Dispensary • Place of worship or prayer or mosque • Parking plaza or parking Site

Source: Devised by Consultant

Map 14: Proposed Residential Zones -Peshawar



Source: Devised by Consultant

Chapter 10: Commerce, Industry and Urban Economy

10.1. Background

Peshawar's economy is diverse, driven by various industries, including agriculture, horticulture, manufacturing, services, and healthcare. The city is a key economic hub in Khyber Pakhtunkhwa, benefiting from its strategic location near Afghanistan and Central Asia. Sectors such as tourism, dairy, cattle, and healthcare services contribute significantly to its economic stability. Peshawar's economy is further strengthened by the presence of economic zones and its potential for increased trade due to investments like CPEC. The city's industrial base is notable for its production of goods like steel, marble, textiles, and food products. Currently, the city hosts 171 industrial units, with economic zones playing a crucial role in its future economic growth.

Agriculture is a significant contributor to Peshawar's economy, supported by fertile soil and efficient irrigation through canals and tube wells. The region is known for producing wheat, maize, sugarcane, and various fruits and vegetables. Peshawar's horticulture sector is particularly strong, with high-quality fruit production that can potentially serve international markets, especially with the connectivity offered by CPEC.

The dairy and livestock industries in Peshawar offer untapped development potential, given the region's large population of farm animals and high milk production. The city's proximity to Afghanistan, Central Asia, and China positions it as a potential regional hub for livestock and dairy products. Additionally, fish farming is emerging as a viable source of income for many residents.

Peshawar also thrives in the services sector, which attracts a large number of visitors. The city's vibrant food culture, coupled with its renowned medical facilities like Shokat Khanum Hospital, draws people from across the region. The city's rich historical heritage, characterized by Mughal-era architecture and ancient bazaars, adds to its appeal as a tourist destination, blending economic and cultural prosperity.

10.2. Commerce and Trade

Currently, the study area consists of 3173 acres of land parcels for commercial activities which serve the study area population. The city's commerce and trade hubs provide a wide range of commercial activities that contribute significantly to its metropolitan economy. The items such as electronics, apparel, shoes, cosmetics, general stores, supplies, food, bakeries, and other basics of everyday life are offered for sale and purchase in city. The city features several wholesale markets, plazas, and individual commercial and mixed land-use units in addition to these major commercial hubs, which collectively have employed thousands of people.

The Sadar Bazaar, Board Bazaar, Khyber Bazaar, Meena Bazar and Jewellery Bazar are the principal shopping areas inside the Peshawar city boundary. The city's bustling market scene is anchored by several prominent bazaars that reflect both its rich cultural heritage and

dynamic commerce. Saddar Bazaar, one of the city's busiest, offers a vast range of products, including clothing, electronics, and local handicrafts, making it a popular shopping destination for both locals and visitors. Board Bazaar, located in the city centre, is known for its affordability and variety, particularly in textiles, garments, and electronics, catering to budget-conscious shoppers and wholesalers alike. Khyber Bazaar, steeped in history, showcases Peshawar's traditional trade, offering antiques, carpets, and authentic local handicrafts that attract those interested in the city's cultural past.

Meena Bazaar focuses primarily on women's clothing and accessories, famous for its wide selection of fabrics, bridal wear, and jewellery, making it a go-to spot for fashion and traditional attire. Jewellery Bazaar, on the other hand, is renowned for its intricate gold and silver designs, often chosen for bridal shopping and special occasions, reflecting Peshawar's rich craftsmanship. Together, these bazaars form the heart of the city's market culture, offering a blend of tradition and modern commerce that defines Peshawar's vibrant economy. Although these commercial areas boost the city's economy, their poorly maintained infrastructure also causes a lot of issues. In the city, problems with parking and encroachment are to blame for the traffic jams.

10.2.1. Future Requirement

According to the NRM standards with respect to existing areas, there is no gap between existing and required commercial land uses for future. Taking into consideration the increase in population over the next 20 years, the requirement for the commercial area has been calculated by using another NRM standard that is; ***1 Acre for 1,000 persons.*** According to this standard the future commercial requirement for the incremental population is as follows;

Table 24: Commercial Area Requirement as per General Standard – Peshawar Study Area

Commercial Area Requirement (2022-2042) Using NRM Standard		
Population 2022	3,388,596 People	
Population 2042	5,936,941 People	
Total Incremental Population	2022-2042	2,548,344
Standard	1 Acre for 1,000 People	
Area Requirement for Commercial	(Acres)	2548.34

Source: Calculated by Consulted

The above table depicts that the area requirement for commercial land use is approximately 2548.34 acres as per the general standard given in NRM.

10.2.2. Proposed Commercial Zones

Keeping in view the commercial area requirement for incremental population, the consultant has proposed around 2,930.4 acres of land for commercial activities in Peshawar study area. The commercial zones have been proposed on the neighbourhood level along the primary and secondary roads in overall study area. In addition, two commercial zones have been proposed within the PLUP proposals, covering a total of 2,195.9 acres. One zone is situated along Bari Road, while the other is located on Phandu Road. Each commercial area proposed

will have 10% of its area allocated for parking purposes in order to reduce the traffic congestion due to on street parking, energy consumption and pollution.

The proposed areas for master plan are shown in the table below:

Table 25: Proposed Commercial Zones for Master Plan

Sr. No.	Proposed Zones	Proposed Areas
		Acres
1.	Proposed Commercial Zones (PLUP)	2195.9
2.	Linear Commercial Development	1880.09
3.	High-Density Mixed-Use Zone (Ground Floor Commercial)	1050.31
Total		**5126.73**

Source: Devised by Consultant

10.3. High Order Central Facilities Zone

Peshawar Master Plan 2042 includes the establishment of a High Order Central Facilities Zone spanning 847 acres, strategically divided into two key zones. Zone 1 is accessible to the BRT (Bus Rapid Transit) system, enhancing its connectivity, while Zone 2 is adjacent to the proposed Ring Road, ensuring ease of access. This area is designated for significant civic and institutional uses, including government and administrative offices, major specialized hospitals, and educational institutions such as IT universities, technical colleges, and research centers. Cultural amenities like museums, galleries, theaters, and large public parks, designed to be gender-inclusive, are also recommended. Additionally, transportation hubs, libraries, archives, green spaces, and public plazas are essential components of this zone, contributing to the creation of a vibrant, well-connected urban hub in Peshawar.

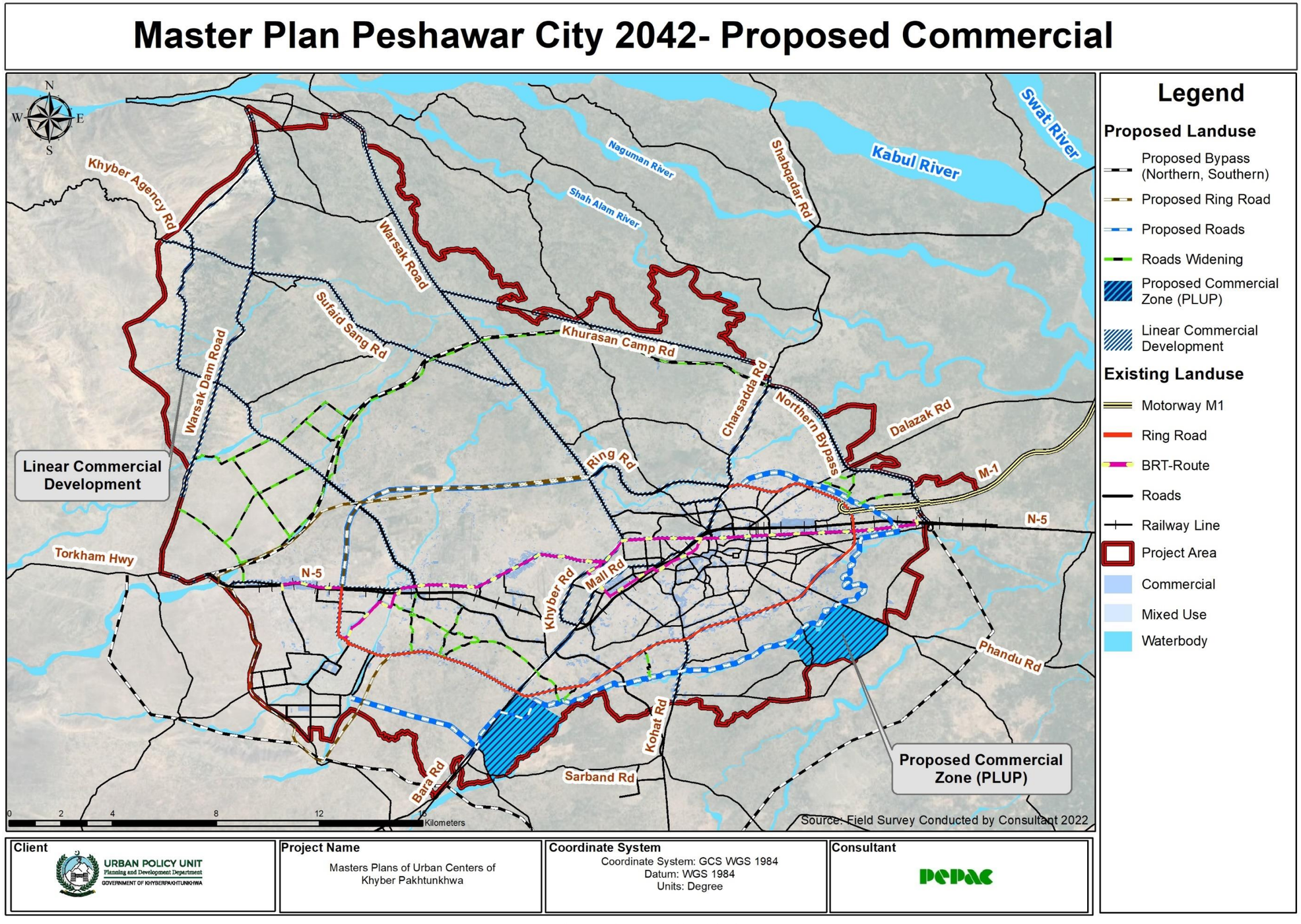
10.3.1. Zoning Regulations for Commercial Zones

Table 26: Zoning Regulations for Commercial - Peshawar

Land use Zone	Permitted Land Uses	Permissible Land Uses
Major Commercial Areas	• Shopping plazas, • Shops and commercial centers, • Educational and research institutions (Colleges and Universities) • Recreational places, • Parks and open spaces, • Public and religious buildings • Clinic or polyclinic • Courier Service and Logistics offices • Wholesale and Grain markets	• Technical Vocation Institutions • Seasonal Commercial fare site • Petrol filling stations, • Hospitals • Residences, • Bus terminals, • Cinemas, • Clubs and all sort of storage. • Service industries and firefighting arrangements governed by the building and space regulations
High Order Central Facilities Zone	• Government and Administrative Offices • Major Specialized Hospitals • IT University, technical colleges, and research centers • Museums, galleries, theaters, and large public parks (gender inclusive) • Transportation Hubs (Bus stand etc) • Libraries and Archives • Green Spaces and Public Plazas	• Petrol and gas filling stations • Hospitals not treating contagious diseases or mental patients.
	•	•

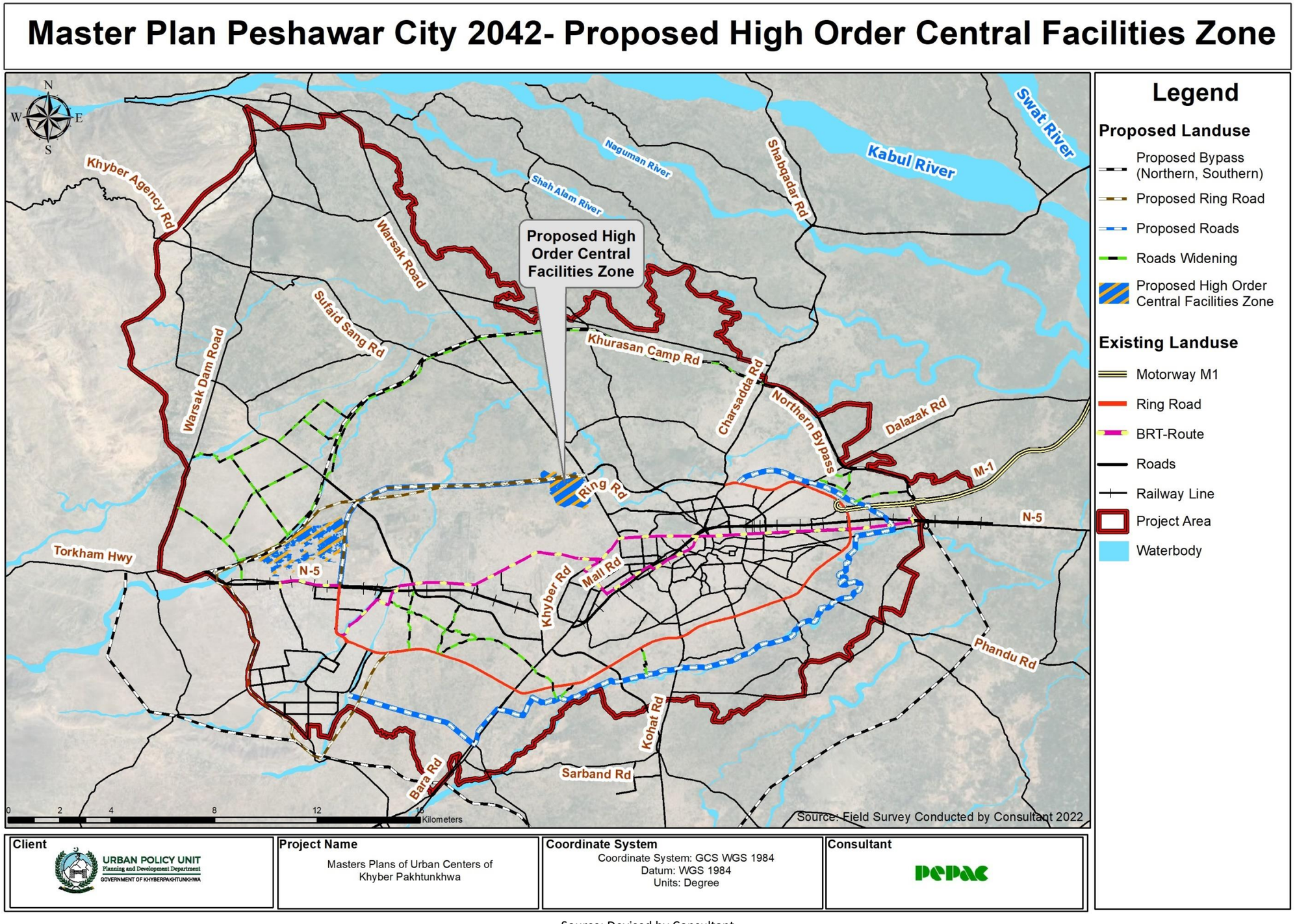
Source: Devised by Consultant

Map 15: Proposed Commercial Zones -Peshawar



Source: Devised by Consultant

Map 16: Proposed High order central facilities-Peshawar



Source: Devised by Consultant

10.4. Industry Comprehensive Proposal

Peshawar's economy stands on a diverse and robust foundation, encompassing sectors such as agriculture, industries, services, and trade. The city's industrial landscape is particularly noteworthy, with a mix of traditional industries and modern developments playing a vital role in its economic growth. The **Development Statistics of Khyber Pakhtunkhwa 2021** reveals a consistent rise in industrial activity within Peshawar District, with 977 registered industrial units in 2019-2020, 907 of which were operational. This marks an increase from previous years, where the district saw 773 registered units in 2018-2019 (with 965 functional) and 751 registered units in 2017-2018 (with 679 functional). This steady industrial growth is a promising sign of increased job creation and improved economic conditions for the city's residents.

Despite the growth in industrial units, economic disparities persist across the region. As noted in the **Social Development in Pakistan Annual Review Report 2014-2015** by the **Social Policy and Development Centre Pakistan**, Peshawar's estimated monthly per capita income was ₨55,246 in 2015. This figure is significantly lower compared to major urban centers like Islamabad (₨117,924) and Karachi (₨66,359). On average, urban residents in Khyber Pakhtunkhwa earn 20% less than the national urban average, which has led to higher levels of urban poverty in the region. These figures reflect the need for continued focus on industrial development, as the growth of this sector is vital for narrowing income gaps and providing sustainable livelihoods for Peshawar's expanding population.

The industrial infrastructure of Peshawar includes several key economic zones and estates that contribute significantly to the city's economy. One of the oldest industrial zones is the **Peshawar Industrial Estate on Jamrud Road**, established in the 1960s over 868 acres. It primarily hosts furniture, marble, and food processing industries, but many plots within this estate remain underutilized, reflecting the need for further investment and development. The **Hayatabad Economic Zone**, covering 866 acres, is another key area of industrial activity. Both zones have the potential to attract significant local and foreign investment, especially with the improved security situation in the province and the strategic opportunities provided by the **China-Pakistan Economic Corridor (CPEC)**. Peshawar is well-positioned to develop advanced industrial facilities, such as automation plants, heavy industrial setups, and nanotechnology plants, which could take advantage of the city's strategic location and growing economic potential.

Peshawar's study area industrial landscape covers an existing area of 843.85 acres, accounting for 0.86% of the study area's total land use. This industrial area contributes significantly to the city's economy, but as the city grows, there is potential for expansion. To support this, various economic zones have been developed and proposed, reflecting the city's focus on industrial development and regional trade.

The Peshawar Economic Zone spans 994.56 acres, playing a key role in boosting industrial activity. In addition, the Pak-Afghan Economic Zone, covering 534.69 acres, aims to strengthen trade ties with Afghanistan and the broader region. Furthermore, an Approved Industrial Zone within the Peshawar Land Use Plan (PLUP) has been designated, covering 2,169.30 acres. These zones are part of broader efforts to enhance industrial growth, create jobs, and foster economic stability in the region.

10.4.1. Zoning Regulation for Industrial Land Use

Table 27: Zoning Regulations for Industrial Land Use - Peshawar

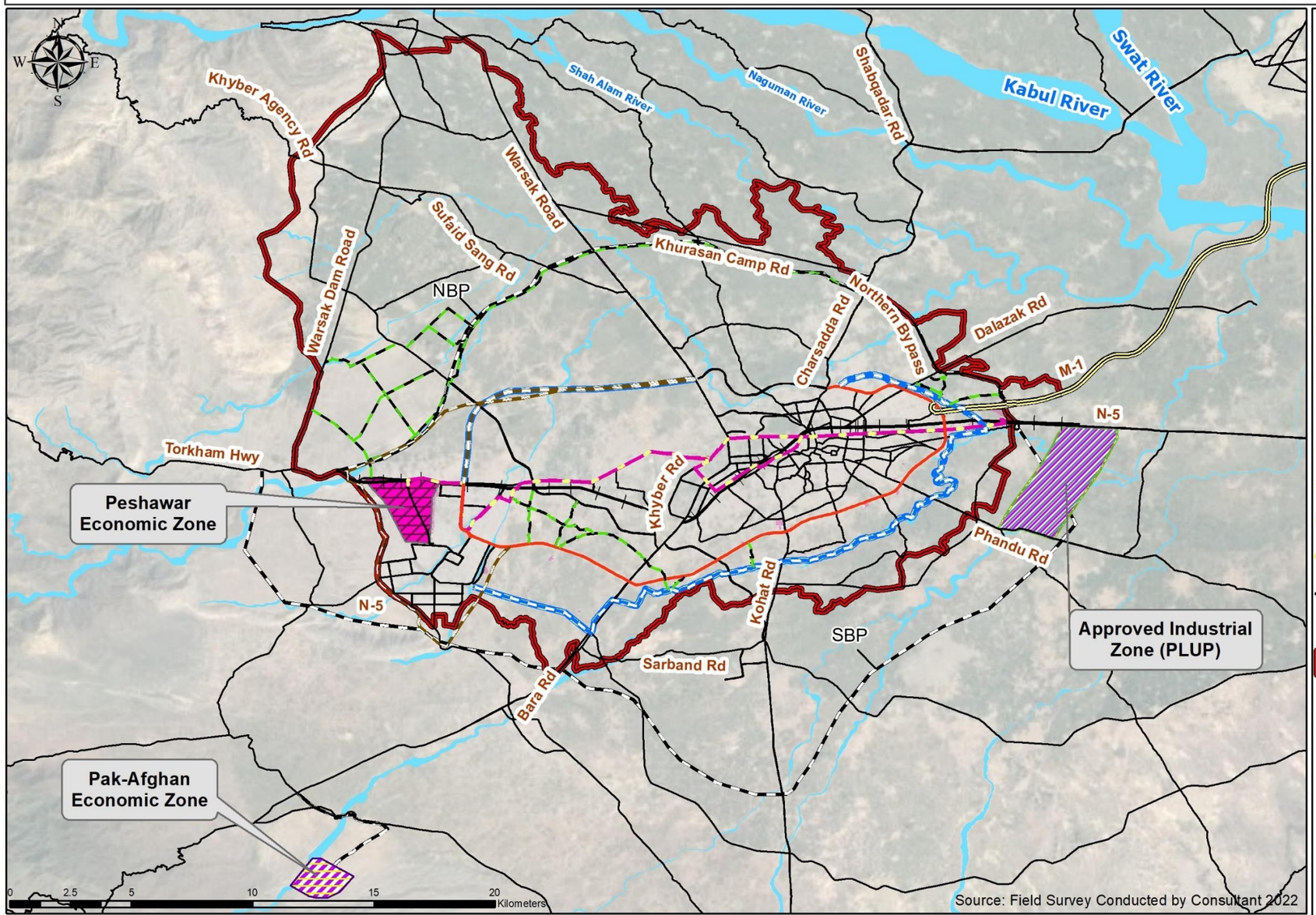
Land use Zone	Permitted Land Uses	Permissible Land Uses	Prohibited Land Uses
Light-Medium Industrial	• Auto-Mechanic Shops/Yards • Research and Development (R&D) Centers • Small Industrial Units • Warehouses and Storage • Business Incubators and Accelerators • Public Utilities and Buildings Canteens • Agriculture (until the area is required for development) • Approved Parking • Loading and Unloading Provisions • Dwellings for watch and ward staff	• Bus and Truck Terminals • Railway passenger and freight terminals • Petrol and gas filling stations • Taxi stands • Recreational facilities for employees.	• Storing, packing, pursing, cleaning, preparing, and manufacturing of blasting powder, ammunition, fireworks, gun powder, sulphur, mercury, gases, nitro-compounds, phosphorous, dynamite, explosives, bombs or any other obnoxious or hazardous material
Medium Industrial	• All categories permitted in the light-medium industrial zone. • Training and Education Centers • Research and Development (R&D) Centers	• All categories permissible on special appeal in Light-Medium industrial zone.	• Storing, packing, pursing, cleaning, preparing, and manufacturing of blasting powder, ammunition, fireworks, gun powder, sulphur, mercury, gases, nitro-

Land use Zone	Permitted Land Uses	Permissible Land Uses	Prohibited Land Uses
	• Business Incubators and Accelerators • Logistics and Distribution Centers • Warehousing, storage depots and incidental uses. • Approved Parking • Loading and unloading provisions. • Dwellings for labor and watch and ward staff.		compounds, phosphorous, dynamite, explosives, bombs or any other obnoxious or hazardous material

Source: Devised by Consultant

Map 17: Proposed Industrial Zone

Master Plan Peshawar City 2042- Proposed Industrial Zone



Legend

Proposed Landuse

- Proposed Bypass (Northern, Southern)
- Proposed Ring Road
- Proposed Roads
- Roads Widening
- Approved Industrial Zone (PLUP)
- Proposed Industrial Buffer (61m)
- Pak-Afghan Economic Zone
- Peshawar Economic Zone

Existing Landuse

- Motorway M1
- Ring Road
- BRT-Route
- Roads
- Railway Line
- Project Area
- Industry
- Waterbody

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Devised by Consultant

Chapter 11: Social Infrastructure

11.1. Health Care Facilities

11.1.1.Existing Background

Before the Sub-Continent was divided, the British system, which was in place at the time, provided healthcare in Pakistan. It consists of both public and commercial sectors that offer primary, secondary, and tertiary care facilities that have changed over time. Dispensaries, basic health units (BHUs), sub-health centres, maternity and child health centres, and rural health centres are examples of how rural and peri-urban communities provide access to healthcare, Pakistan has a network of primary and secondary healthcare centres. The private and public health sectors operate the urban tertiary care facilities.

In the past ten years, the health sector has undergone a number of improvements. The 18th Constitutional Amendment of Pakistan, which went into effect in 2010, gave the provinces legislative and executive authority over the health sector, which had previously been under the control of the federal government. Despite the fact that both public and private organisations in Peshawar offer healthcare services, the government is often regarded as the primary source of preventative care in the whole city. A tier-based referral system of healthcare institutions, with increasing degrees of complexity and coverage from primary to secondary and tertiary healthcare facilities, is used to deliver health services in the public sector. Basic health units (BHUs), rural health centres (RHCs), government rural dispensaries (GRDs), mother and child health (MCH) centres, and TB centres are examples of primary care institutions. While RHCs offer a wider variety of curative treatments, 24/7, all of these institutions only offer 8/6 OPD services for preventive and a small number of curative therapies. Additionally, primary care centres offer outreach preventative treatments to the 8 communities through sanitary inspectors, a sanitary patrol, and vaccines. Teaching hospitals make up the tertiary level tier, while tehsil and district headquarters hospitals offer secondary health care that is becoming more and more specialised.

The study area is recorded to have 14 Basic Health Units, 14 civil dispensaries, 4 Mother Child Healthcare, 1 Civil Military Hospitals and 6 public hospitals namely Institute of Radiotherapy and Nuclear Medicine, Lady Reading Hospital, Khyber Teaching Hospital, Peshawar Institute of Cardiology, Hayat Abad Medical Complex, and Naseer Ullah Babar Memorial Hospital, having total number of beds 5,477 serving a population of 2,868,714 in 2017. The number of beds available in all the public hospitals is given in the following table:

Table 28: Number of Beds in Public Hospitals – Peshawar Study Area

Sr. No.	Hospital Name	No. of Beds
1	Institute Of Radiotherapy and Nuclear Medicine	75
2	Lady Reading Hospital	1,797
3	Khyber Teaching Hospital	1,800
4	Peshawar Institute of Cardiology	295
5	Hayat Abad Medical Complex	1,280

Sr. No.	Hospital Name	No. of Beds
6	Naseer Ullah Babar Memorial Hospital	230
Total		5,477

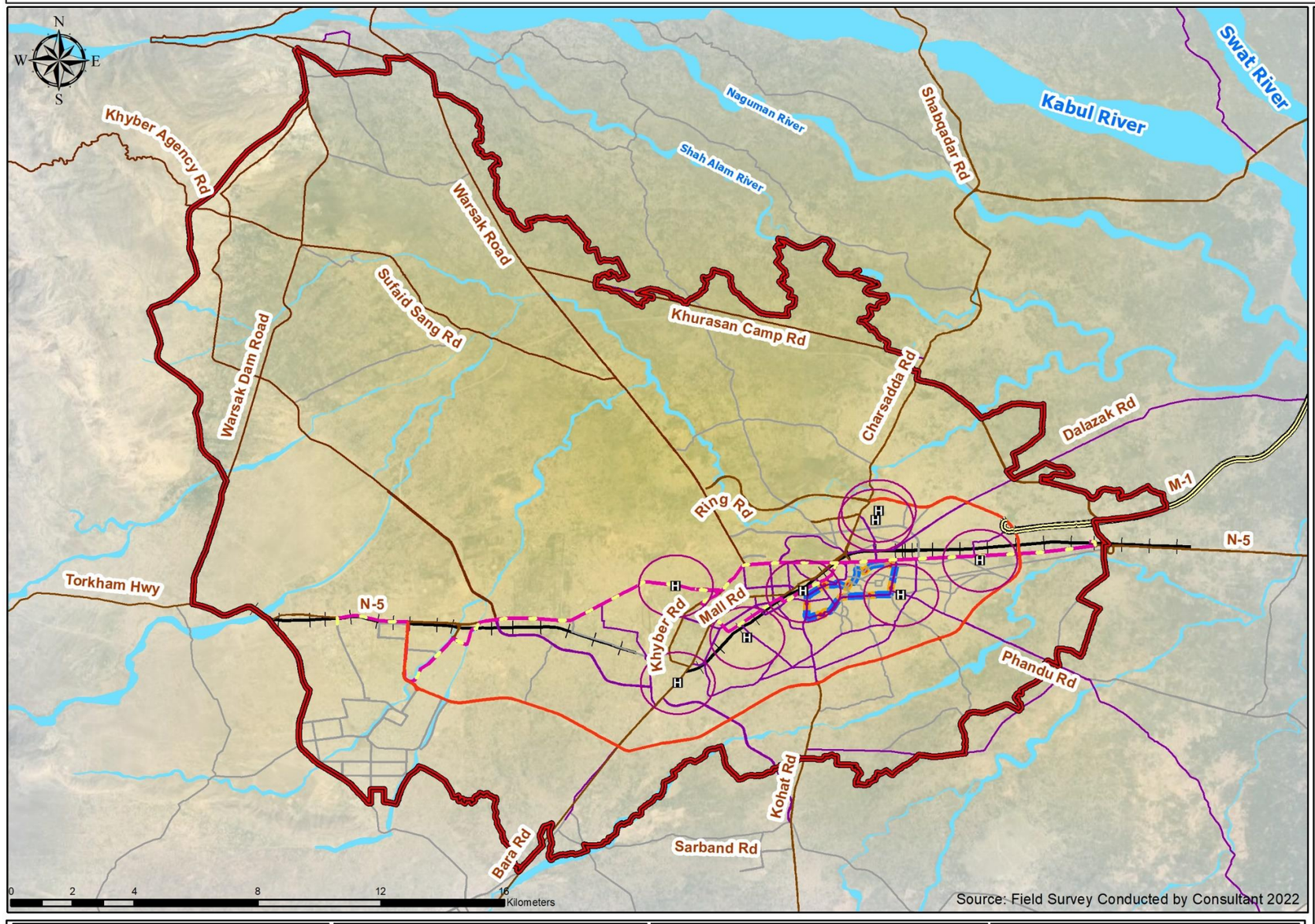
Source: Secondary Data Collected from Different Sources

11.1.1.1. Accessibility of Health Facilities

Accessibility to any particular place can be determined in two ways i.e., walkability distance and driving distance. In terms of walkability distance, the standard is 600m to 1km distance which is assumed that a person can travel without any problem. In regard to driving distance, there is no set standard, however, keeping in consideration the existing traffic situation and assuming that using the driving speed is 40km/h, in 10 minutes, distance of approximately 6km can be covered. Two buffers have been drawn, one is of 1km for walkability and the other is on 5km which is driving distance to understand the proximity and accessibility of the public health facilities. The walkable distance shows that many areas cannot access public health facilities, however, if driving distance is used almost entire study area can access the available public health facilities. This does not change the fact that with respect to the population, the number of schools are quite low, and more are required in the next twenty years. The following maps show accessibility of public health facilities with respect to walkability and driving;

Map 18: Accessibility Map of MCH in Urban Peshawar

Accessibility Map MCH - Peshawar



Legend

- MCH
- Motorway M1
- Ring Road
- BRT-Route
- Primary Road
- Secondary Road
- Tertiary Road
- Railway Line
- Walkability Distance 1Km
- Project Area

Existing Landuse

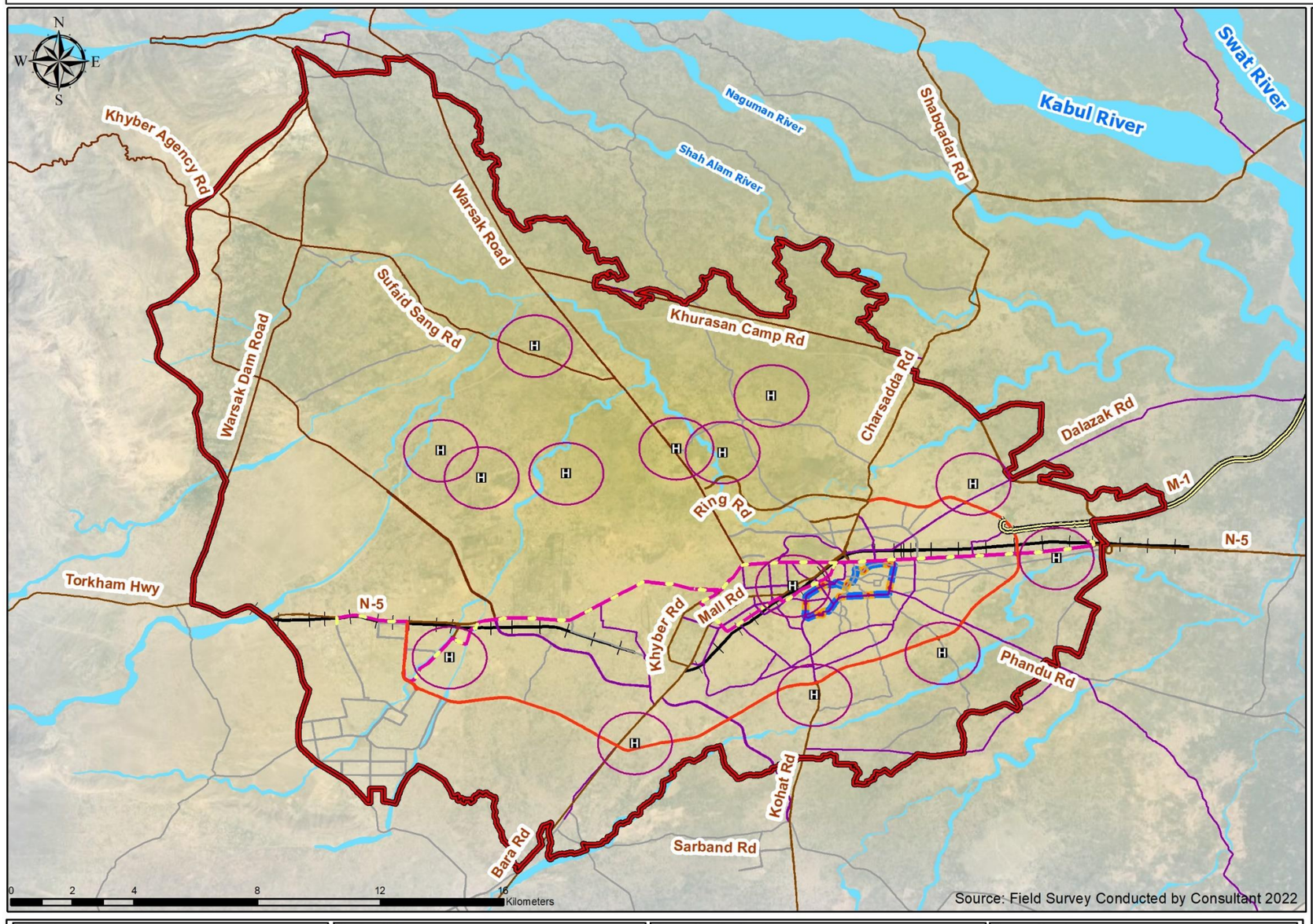
- Waterbodies
- Walled City

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Primary Data Collected from Field Survey

Map 19: Accessibility Map of BHU in Urban Peshawar

Accessibility Map BHU - Peshawar



Legend

- BHU
- Motorway M1
- Ring Road
- BRT-Route
- Primary Road
- Secondary Road
- Tertiary Road
- Railway Line
- Walkability Distance 1Km
- Project Area

Existing Landuse

- Waterbodies
- Walled City

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Primary Data Collected from Field Survey

11.1.2.Required Facilities

As a Basic Health Unit serves up to 25,000 people, the city should have at least 105 of these facilities to accommodate such a population. In Peshawar, there ought to be at least 175 dispensaries to achieve the minimum standards mentioned in NRM. According to WHO regulations, there should be a minimum of 3 hospital beds for every 1000 people.

Table 29: Existing number of health facilities and beds as compared to requirements and standards

Category	Existing	Minimum Requirement	Current Gap	Standard
Basic Health Unit (BHU)	14	105	88	1 BHU for 25000 people
Maternal Children Health Centre (MCH)	4	35	30	1 for 75000 people
CMH	5	N/A		
Dispensary	14	175	156	1 for 15000 people
Public Hospitals	6	5	No Gap	Criteria of THQ (1 hospital for 0.5 to 1 million)
Private Clinics	345	-	-	-
Beds in all of the health facilities	5,477	7,858	2168	3 for 1000 people

Source: Devised by Consultant

11.1.3.Gap Analysis of Healthcare Facilities in Peshawar

Future healthcare requirements for the city of Peshawar were calculated using population requirement criteria from the National Reference Manual. According to the specifications, there should be a civic dispensary for every 15,000 people and a Basic Health Unit for every 25,000 people. Based on these principles, the table below provides future specifications for healthcare facilities.

Table 30: Gap Analysis for Healthcare Facilities

Year	Population	Increase in Pop	Basic Health Unit (BHU)	RHC	Dispensary	DHQ	Public Hospital (criteria of THQ)	Beds
2017	2,868,714	N/A	115	38	13	1	6	8,606
2022	3,388,596	519,882	21	7	35	0	1	1,560
2027	3,946,867	558,271	22	7	37	0	1	1,675
2032	4,551,218	604,351	24	8	40	0	1	1,813
2037	5,210,882	659,664	26	9	44	0	1	1,979
2042	5,936,941	726,059	29	10	48	0	1	2,178

Source: Devised by the consultant

If 3 beds are required for a population of 1000, then according to the population, 8,606 beds were required in the study area in 2017. To achieve the standard set by the WHO of 3 hospital beds for a population of 1000, Peshawar needs additional 1,560 beds by 2022. If the requirement is met by 2027 then in 2027, additional 1,675 beds will be required, in 2032 addition 1,813 beds, in 2037 additional 1,979 and in 2042 additional 2,178 beds will be required. In order to reach these figures, new hospitals can be built, or new wings can be developed in existing hospitals, or additional beds might be added to the city's current public hospitals.

11.1.4.Area Requirements for Healthcare facilities

Some of the Peshawar BHUs are 0.3 acres, 0.2 acres, 0.4 acres and 0.7 acres in size. The National Reference Manual states that a BHU should be between 0.2 and 0.6 acres in size. Therefore, the sizes of BHUs are according to the standards of NRM. The size of MCHs of Peshawar is 0.34 acres, 0.64 acres and 1.3 acres. The sizes of MCHs do not adhere to the guidelines of NRM

Table 31: Number of Health care facilities Required with Area (2022-2042)

Sr. No	Health Institute Type	Standard for Area Required by Each (acre)		Required number of Facilities	Area Requirement by 2042 Acres	
		Minimum	Maximum		Minimum	Maximum
1	CD	0.02	0.05	156	3	8
2	BHU	0.3	0.6	88	26	53
3	MCH	2.47	2.47	30	74	74
4	DHQ	12.3	19.74	0	0	0
5	THQ	4.94	4.94	0	0	0
Total				**274**	**104**	**135**

Source: Devised by the consultant

Overall, sustainable accessibility of health facilities is essential for promoting individual as well as population health, reducing healthcare costs, increasing economic productivity, promoting social equity, and reducing health disparities. By investing in sustainable healthcare infrastructure, we can ensure that all individuals have access to the care they need to lead healthy, productive lives. The proposed health care facilities fulfil the population standards of NRM, ensuring that the healthcare needs of the community are met. The health care facilities in master plan are proposed to be accessible for majority of the community at neighbourhood level.

11.1.5.Proposed Healthcare Zones

To fulfil the gap in healthcare facilities in Peshawar, the total of 89.74 acres of area has been proposed at Neighbourhood level. The proposed allocation of 89.74 acres for neighborhood-

level healthcare facilities in Peshawar is a strategic response to the gaps identified through an accessibility analysis and population needs assessment. These healthcare facilities are targeted at underserved Neighbourhood Councils (NCs) and Village Councils (VCs), where access to basic health services is limited or entirely absent. By distributing healthcare services more equitably, the plan ensures that all residents, especially vulnerable groups such as the elderly, women, and children, have access to necessary medical care within their localities. The provision of healthcare facilities in these areas aligns with global best practices in urban planning, prioritizing universal health coverage and equitable healthcare access.

The allocation of land is driven by the growing population and urban density projections for Peshawar. By situating healthcare facilities in high-density and underserved areas, the plan not only addresses current deficits but also anticipates the rising demand for health services by 2042. The integration of these facilities into the urban fabric, especially near public transportation routes as part of Transit-Oriented Development (TOD), enhances accessibility while reducing travel distances for residents. The neighbourhood-based approach to healthcare is designed to promote preventive care, ensuring early medical intervention, improving public health outcomes, and reducing pressure on larger hospitals. Through this targeted, integrated, and sustainable approach, Peshawar's healthcare infrastructure will be better equipped to support the city's growing population and their healthcare needs.

Table 32: Proposed Zone for Health care Facilities - 2042

Area of Existing Health-care Facilities 2022 (acres)	Proposed area for Health Care Facilities (acres)	Total Area (acres)
308.88	89.74	398.62

Source: Devised by Consultant

11.1.6.Zoning Regulation for Health care Zone

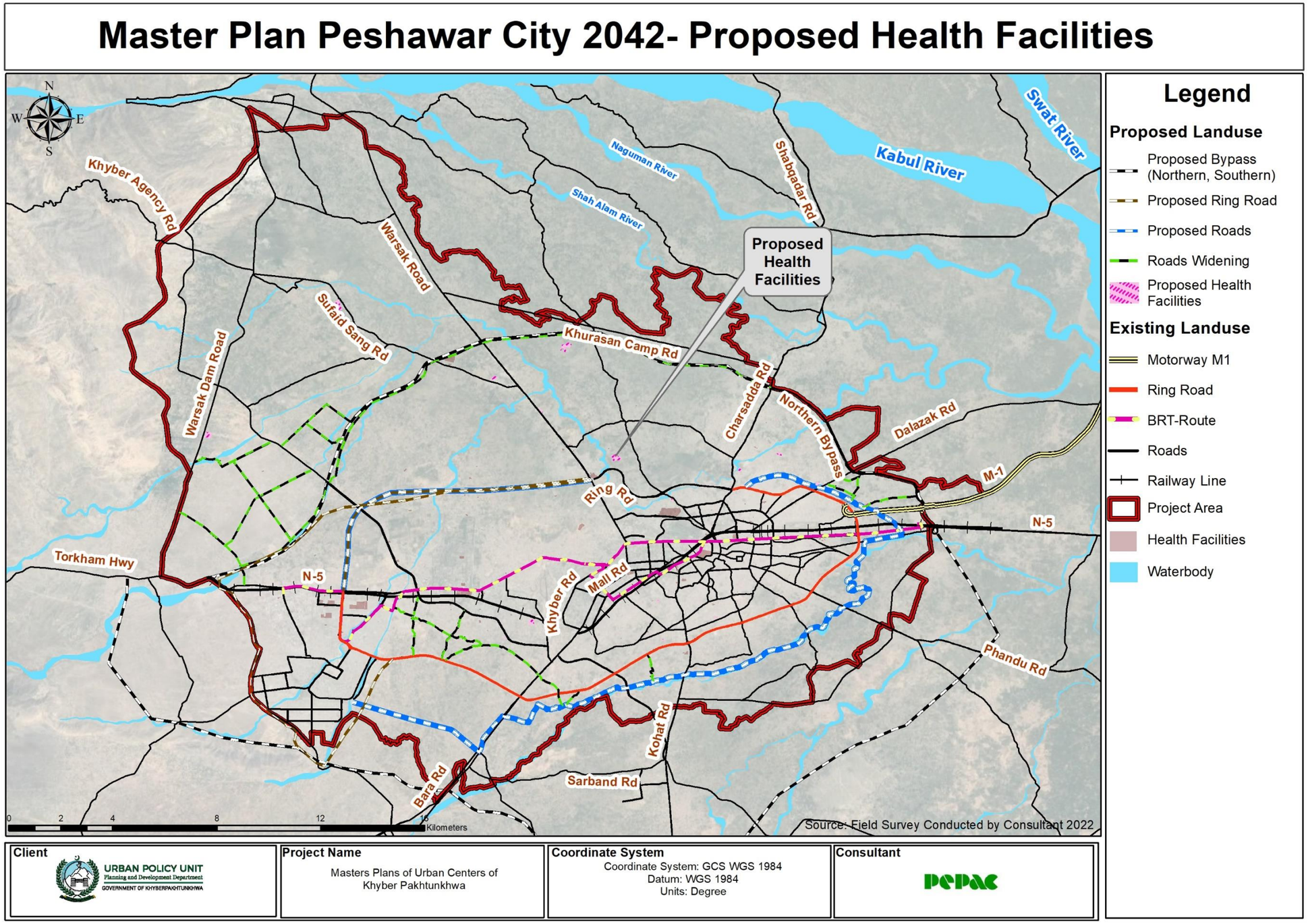
Table 33: Zoning Regulations for Health care Zone - Peshawar

Land use Zone	Permitted Land Uses	Permissible Land Uses
Health	• Hospitals • Burn Units • Basic Health Units • Teaching Hospital • Medical Research Centres • Staff Residencies • Community facilities • Parking lots • Urban Forest • Religious Place • Veterinary Hospital	• Playlands & Amusement Parks • Hostels • Hotels & Restaurants • Banks • Gymnasiums & Clubs • Cinema • Petrol Pumps • Banks

	• Clinical Laboratory • Day care centre or Pre schools • Support facilities (bus stops, parking lots, civil dispensaries and small green open spaces)	

Source: Devised by Consultant

Map 20: Proposed Healthcare Zones – Peshawar Study Area



Source: Devised by Consultant

11.2. Educational Facilities

11.2.1.Existing Background

Social transformation and education go hand in hand. Education plays a significant role in this process by giving people access to knowledge that will help shape their future decisions on how to best move forward into bettering themselves through improved opportunities or more stable lives. The citizens of any nation are responsible for not only their futures but also for those who come after them. People raise their level of living via education. The value and standard of education are rising daily. For Pakistan's development and prosperity, education awareness is crucial.

Facilities and infrastructure become the indicators of the quality of education because facilities and Infrastructure in education are the determining factors in the success of education. The completeness of educational facilities and infrastructure in school greatly influences the effectiveness of learning, both in and out of the classroom. The process of achieving educational goals needs to be supported by good quality resources, both human and material, and facilities and infrastructure are one of the material resources.

It is the province's biggest urban area. The public is educated through a significant network of universities and colleges in the city. The government sector cannot provide all residents with access to free and affordable education due to growing population pressure. As a result, private schools are doing their part to educate the entire population. Private schools charge monthly, per semester, or yearly tuition and are wholly owned by an individual or group. The improvement of both the public and private education systems will result from the implementation of this strategy.

In recent years, Peshawar's educational system has improved. The province's current administration has improved educational policy, and the changes have produced good outcomes. The city's enrolment rate has increased as a result of the recruitment of new teachers, the reopening of closed institutions, the decrease in teacher absenteeism, the termination of many ghost employees, salary increases for teachers, and improvements to the overall environment of educational institutions. In Peshawar, it has been observed repeatedly that parents prefer to enrol their kids in private schools over public ones because they believe the former offer a better learning environment and more opportunities for students. However, as a result of government educational institute reforms and improvements, many students who previously attended private schools are now attending public ones.

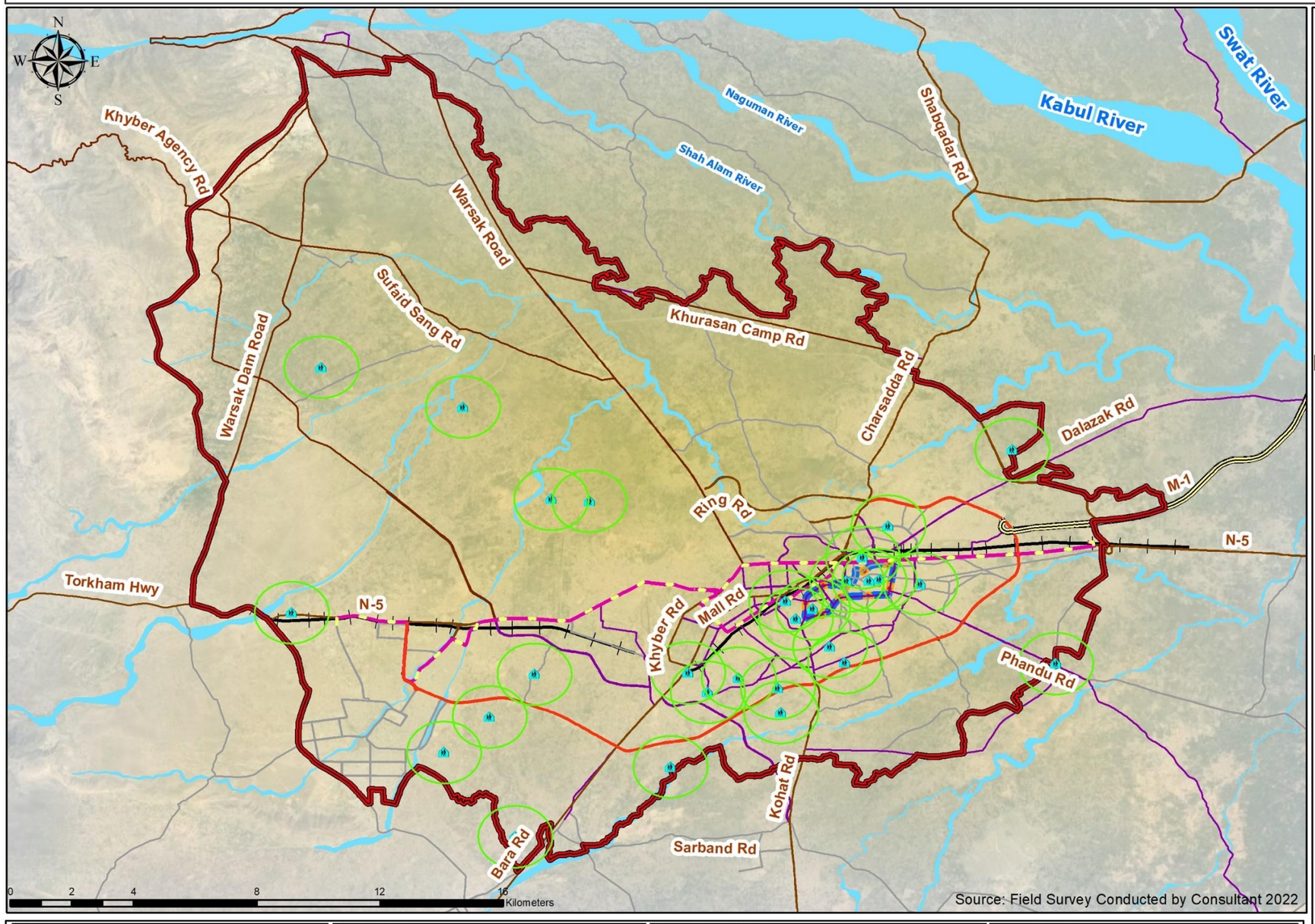
11.2.2.Accessibility Analysis

Accessibility to any particular place can be determined in two ways i.e., walkability distance and driving distance. In terms of walkability distance, the standard is 600m to 1km distance which is assumed that a person can travel without any problem. In regard to driving distance, there is no set standard, however, keeping in consideration the existing traffic situation and

assuming that using the driving speed is 40km/h, in 10 minutes, distance of approximately 6km can be covered. Two buffers have been drawn, one is of 1km for walkability distance to understand the proximity and accessibility of the public educational institutes. The walkable distance shows that many areas cannot access public educational institutes, however, if driving distance is used almost entire study area can access the available public educational institutes. This does not change the fact that with respect to the population, the number of schools are quite low and more are required in the next twenty years. The following maps show accessibility of public educational institutions with respect to walkability and driving.

Map 21: Accessibility Map of Middle Schools in Urban Peshawar

Accessibility Map Middle School - Peshawar



Legend

- Middle School
- Motorway M1
- Ring Road
- BRT-Route
- Primary Road
- Secondary Road
- Tertiary Road
- Railway Line
- Walkability Distance 1Km
- Project Area

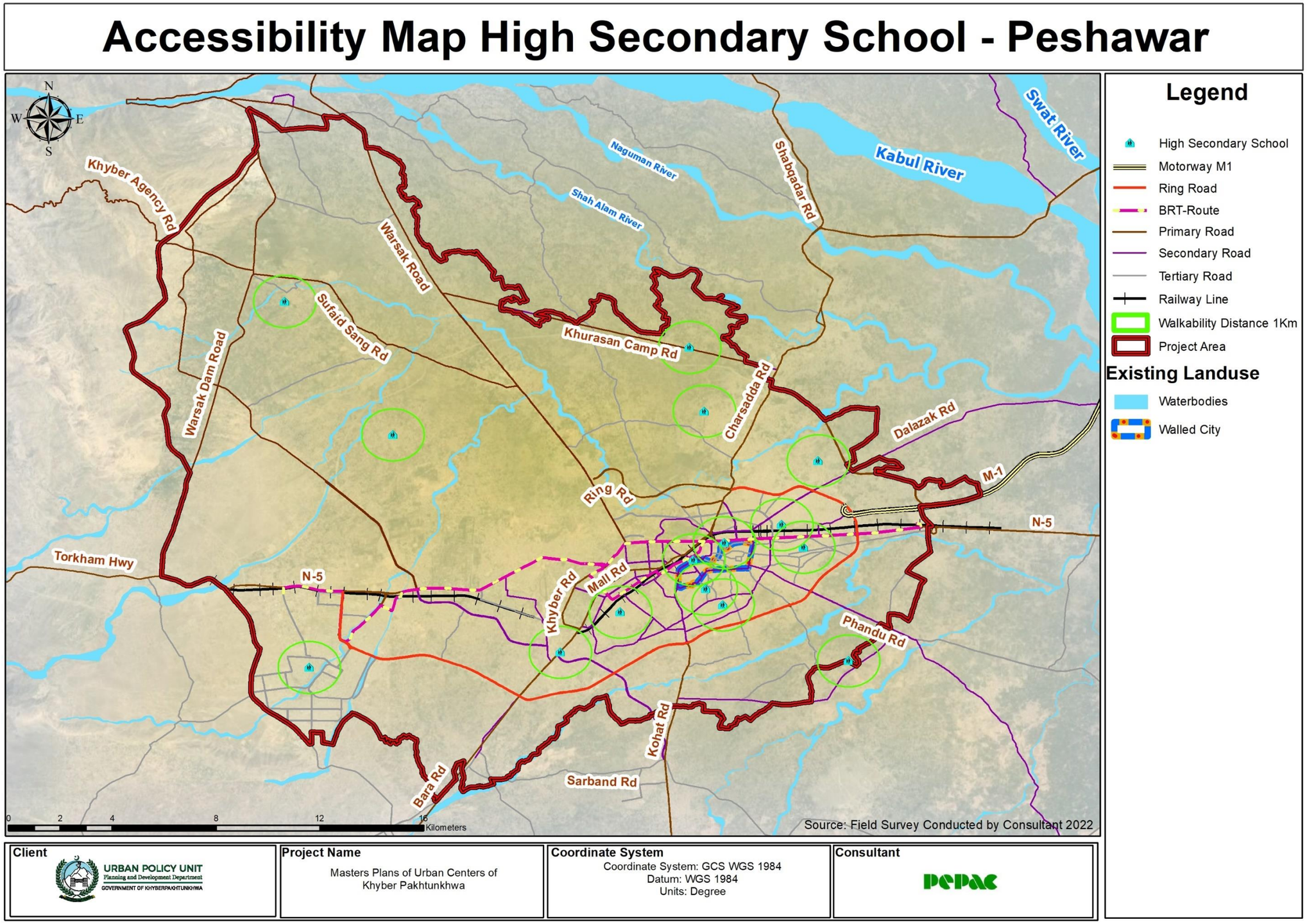
Existing Landuse

- Waterbodies
- Walled City

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Primary Data Collected from Field Survey

Map 22: Accessibility Map of High Schools in Urban Peshawar



Source: Primary Data Collected from Field Surve

Establishing new schools and institutions are not enough for the provision of quality education. Enhancement and upgradation of educational system is essential for the provision of better education services in the study area. The proposed educational institutions are recommended to be equipped with modern technology and resources to enable students to compete globally. Moreover, programs must be set up to promote parental involvement in their children's education and emphasize the importance of parents in their child's schooling. The need for skilled teachers and relevant training programs are the prime need for the establishment of better education system. Furthermore, these proposals also include establishment of vocational institutions and technical training programs which will enable the economy of the Peshawar study area by producing skill labor force and employment opportunities.

11.2.3.Gap Analysis of Education in Peshawar

There are 558 primary schools, 81 middle schools, 74 high schools, 33 higher secondary schools and 23 public colleges in the study area. These are all government institutions. Apart from these, there are a total of 17 public and private universities in Peshawar. According to the NRM standards, a primary school is required for a population of 7500. A middle school is required for a population of 17000 and a high school is required for a population of 74000. For a college, a population of 170,000-400,000 is required. These are the minimum requirements mentioned in the National Reference Manual. However, since Peshawar is a metropolitan city, there are numerous private schools and colleges available at walking and driving distance. Therefore, the standard has been modified keeping in view the presence of private facilities. For a public primary school, the standard has been modified to equivalent of four times population i.e., 30,000, while the remaining standards have been modified to equivalent of double population i.e., 34,000 and 150,000.

Table 34: Gap Analysis of Educational Facilities

Type of Educational Facility	Number of Existing Facilities	Increase in population by 2042	Minimum Requirement 2022-2042	Current Gap	NRM Standard
Primary School	558	2,548,344	340	-218	1 for 7500
Middle School	81	2,548,344	150	69	1 for 17000
High School	74	2,548,344	34	-33	1 for 74000
Higher Secondary School	33	2,548,344	15	-18	1 for 170,000 - 400,000

Type of Educational Facility	Number of Existing Facilities	Increase in population by 2042	Minimum Requirement 2022-2042	Current Gap	NRM Standard
University (Public/Private)	17	2,548,344		No Gap	

Source: Devised by the consultant

The literacy rate of Peshawar city is 64.4%, according to the Pakistan Bureau of Statistics, while according to the PSLM 2019-2020, 71% of the population has attended school. In the city, primary or higher education has been completed by 60% of residents, including both men and women. At the primary level, which is from ages 6 to 10, the net enrolment rate is 79%. At the middle level, which is from years 11 to 13, it is 49%. At the matric level, it is 33% (ages 14 to 15). According to PSLM, 26% of females between the ages of 5 and 16 were not attending school, compared to 13% of boys in the same age group. Girls who drop out of school frequently may do so for a number of reasons, including poverty, early marriage, and cultural norms.

11.2.4.Proposed Educational Zones

Distinct zones have been carefully designated within the study area to accommodate future demand, covering a total of 110.68 acres. These zones are specifically designed to address the growing need for educational facilities at the neighbourhood level, ensuring that education is accessible to all communities. The proposal advocates for vertical development, emphasizing a reduction in ground coverage while increasing building heights. This approach not only meets the projected educational demand but also optimizes the use of limited urban space.

By prioritizing vertical expansion, the proposal enhances land-use efficiency, allowing for the construction of taller educational buildings with smaller physical footprints. This strategy conserves valuable land, which can be repurposed for essential public amenities, including green spaces, parks, and infrastructure development. This sustainable approach ensures that educational facilities are integrated into the urban landscape without overwhelming it, providing a balanced solution that supports both the city's growing population and the need for livable, vibrant communities.

Table 35: Proposed Area for Educational Zones - 2042

Area of Existing Education Facilities 2022 (Acres)	Proposed Area (acres)	Total Area till 2042 (acres)
1551.82	110.68	1662.5

Source: Devised by Consultant

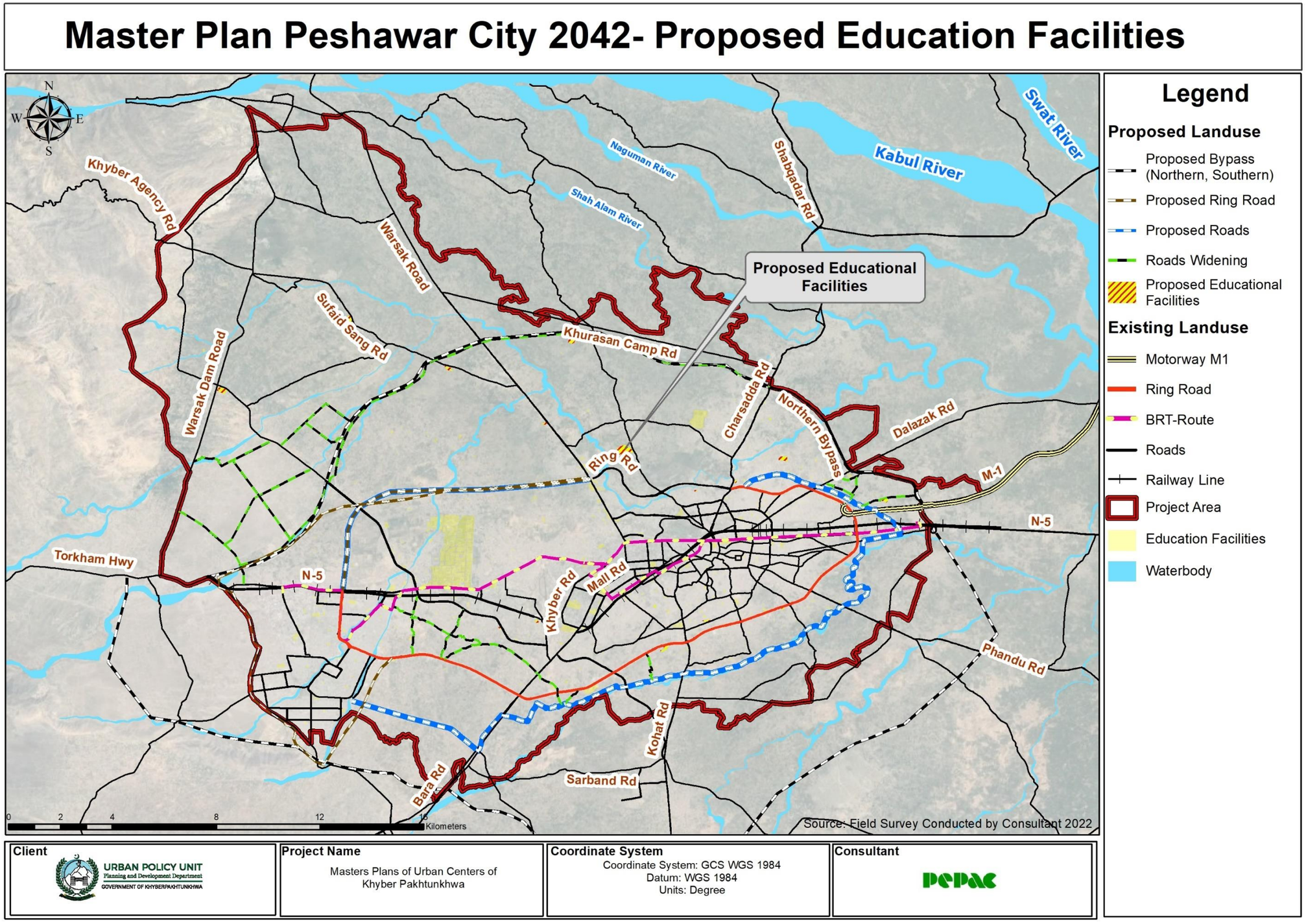
11.2.5.Zoning Regulation for Educational Zone

Table 36: Zoning Regulations for Educational Zone - Peshawar

Land use Zone	Permitted Land Uses	Permissible Land Uses
Educational Zone	• Schools, Colleges & Other Educational Institutions • Universities • Research Centres • Incubation Centres • Offices of Social and Cultural Organizations • Religious Institutions • Parks, Memorials and Monuments • Library • Language Centres • Parks • Public Utilities and Buildings • Community Facilities, Arts Councils and Auditoriums • Government Offices • Taxi Stands, Bus Halts • Approved Parking Provisions	• Hotels Offices of Commercial Institutions • Restaurants and Clubs • Commercial Recreational uses like theatre halls and cinemas • Petrol and gas filling Station • Limited Retail Shopping

Source: Devised by Consultant

Map 23: Proposed Educational Zones – Peshawar Study Area



Source: Devised by Consultant

Chapter 12: Parks and Recreational Facilities

Recreational and open spaces play a crucial role in sustainable development. They provide social, economic and environmental benefits that contribute to the well-being of individuals and communities. Peshawar faces the challenge of disappearing incidental open spaces and inadequate planned recreational areas, exacerbated by high land prices, population density, and intense competition for land use. The need for active outdoor recreational spaces is crucial but must be weighed against other land demands. Sports facilities in Peshawar play a vital role in promoting community health and fostering a strong societal fabric. The district is home to provincial and international sports venues, including the Qayyum Sports Complex, Hashim Khan Sports Complex, and Arbab Niaz Cricket Stadium, which serve as hubs for both local and international sporting events. Additionally, cricket academies like Islamia Cricket Academy further support sports development in the region.

Entertainment also plays a significant role in enhancing Peshawar's cultural and tourism experience. The city's entertainment industry primarily revolves around its hotels and restaurants, offering a wide range of options from international food chains to local favorites Restaurant. The availability of diverse dining options contributes to Peshawar's appeal as a tourism destination, attracting both local and international visitors. Peshawar's hospitality sector includes major hotels, cccommodators, and several guest houses, accommodating tourists and business travelers alike.

Religious and cultural diversity is another hallmark of Peshawar. The city has long served as a central hub in South Asia, attracting people from various ethnic and religious backgrounds. This diversity is reflected in the array of religious places across the district, including mosques, churches, temples, and gurdwaras. Notable religious sites include Masjid Al-Zarghoni, All Saints Church, and Kalibari Mandir, which represent the different faith communities in the region. These religious sites contribute to the cultural richness of Peshawar, making it a significant location for religious tourism.

Peshawar also boasts a variety of museums and libraries that preserve and promote the region's historical and cultural heritage. The Peshawar Museum, established in 1907, and the Gor Khatri archaeological site are key attractions, showcasing the city's rich past. Other museums, such as the Pashtun Culture Museum and the Sethi House Museum, further contribute to the city's cultural landscape. Peshawar's libraries, including the Shuhada-e-APS Public Library, offer vast collections of literature and serve as important knowledge hubs for the region.

Sporting events have played pivotal roles in creating healthy communities around the globe. Today, contests pushing physical limits are more popular than ever before. As interest in healthy and longevity continues to rise, and government business continue to see sporting events as sound investment and long-lasting impact, sports can play a vital role in shaping a vigorous society for foreseeable future. Peshawar district as the provincial headquarter of KP has both provincial and international scale sports facilities the detail of which are as follow.

- Qayyum Sports Complex
- Hashim Khan Sports Complex
- Hayatabad Sports Complex
- Arbab Niaz Cricket Stadium
- Peshawar Club Ground
- Peshawar Golf Course

12.1. Proposed Recreation/Open Spaces

The study area of Peshawar consists of few total recreational facilities as well as parks and playgrounds spreading on an area of 839 acres. However, recognizing the importance of such spaces in enhancing the quality of life and well-being of residents, the proposed plan aims to significantly increase these areas to a total of 111.86 acres by 2042. This includes the establishment of the neighbourhood level parks, which is envisioned as a recreational haven harmonizing nature and adventure. This zone is proposed to offer a serene escape within a wooded environment, complemented by thrilling adventure activities. Visitors can immerse themselves in the beauty of nature while enjoying a range of recreational pursuits that cater to both adventure enthusiasts and those seeking a peaceful retreat.

Table 37: Area Proposed for Recreational/Open Spaces Zones - 2042

Existing Recreational/Open Spaces (acres)	Proposed Recreational/ Open Spaces (acres)	Total Recreational/Open Spaces by 2042 (acres)
839.90	111.86	951.76

Source: Devised by the consultant

12.2. Zoning Regulation for Recreational Zone

Table 38: Zoning Regulations for Recreational Zone - Peshawar

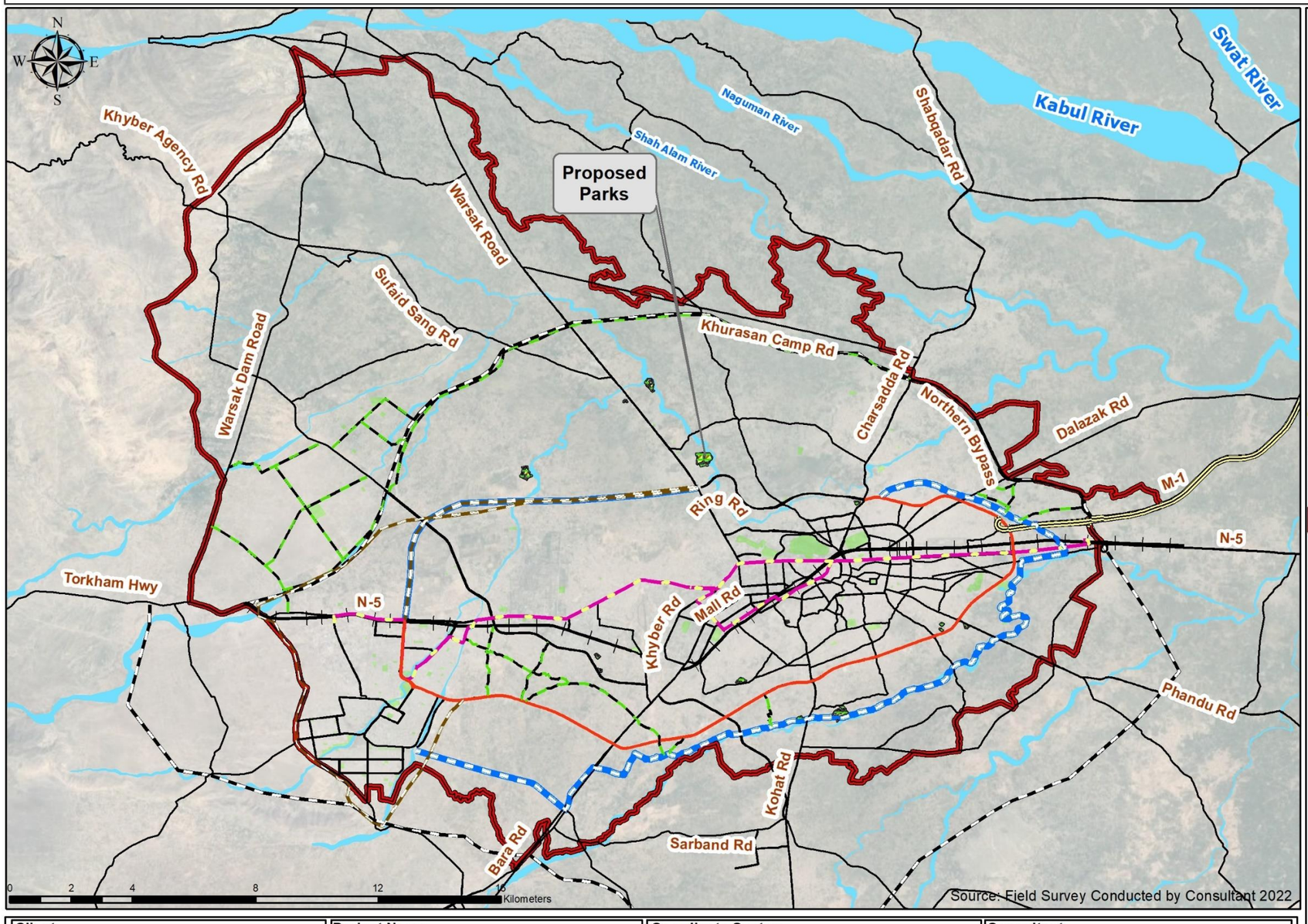
Land use Zone	Permitted Land Uses	Permissible Land Uses
Recreational Areas	• Recreational areas including parks, playgrounds and related uses. • Amusement Parks and Playlands • Youth hostels and clubs • Bus halts and car parking areas.	• Restaurants and establishments selling eatables • Incidental recreational uses. • Graveyards • Guest house

Land use Zone	Permitted Land Uses	Permissible Land Uses
	• Dwellings for watch and ward staff. • Urban Forest • Orchard • Plant Nurseries • Botanical Garden • Swimming Pool • Picnic Hut • Shooting Range • Botanical Garden • Public utilities and municipal facilities.	

Source: Devised by Consultant

Map 24: Proposed Recreational Open Spaces - Peshawar Study Area

Master Plan Peshawar City 2042- Proposed Parks



Legend

Proposed Landuse
- Proposed Bypass (Northern, Southern)
- Proposed Ring Road
- Proposed Roads
- Roads Widening
- Proposed Parks

Existing Landuse
- Motorway M1
- Ring Road
- BRT-Route
- Roads
- Railway Line
- Project Area
- Park & Playground
- Waterbody

Client	Project Name	Coordinate System	Consultant
URBAN POLICY UNIT, Planning and Development Department, GOVERNMENT OF KHYBERPAKHTUNKHWA	Masters Plans of Urban Centers of Khyber Pakhtunkhwa	Coordinate System: GCS WGS 1984 Datum: WGS 1984 Units: Degree	PEPAC

Source: Devised by Consultant

Chapter 13: Agriculture Sector

The agriculture sector plays a crucial role in Peshawar's economy, much like the rest of Pakistan, contributing significantly to employment, income, and food security. Agriculture constitutes a substantial part of the country's economy, contributing about 24% to the Gross Domestic Product (GDP) and providing almost half of the country's employed labor force. In Peshawar, agriculture supports a large portion of the rural population, directly or indirectly, through the cultivation of crops and livestock farming. Peshawar's agricultural activities are diverse, producing both food and cash crops, which are vital for both local consumption and export.

Peshawar benefits from its fertile soil, a rich mixture of clay and sand, that is well-suited for the cultivation of various crops. The district is known for its production of staple crops like wheat, maize, sugarcane, and barley, as well as a variety of fruits and vegetables. The fertile lands, coupled with favorable climatic conditions, allow for the year-round cultivation of crops. Wheat and maize are particularly important for the local food supply, while sugarcane is a valuable cash crop. The crop production in the district not only sustains the local population but also contributes to the larger provincial and national economy through the supply of agricultural goods.

The irrigation system in Peshawar is another important component of its agricultural success. The district is watered by both the Kabul and Bara Rivers, which provide ample water for irrigation through a network of canals. The Kabul River, which enters the district at Warsak, flows southeastward, and is divided into two main channels—the Adezai (Hajizai) and the Naguman—helping to irrigate large swaths of agricultural land. In addition to river-fed irrigation, tube wells, lift irrigation, and well irrigation also play a role in supplying water to fields. This extensive irrigation network ensures that crops can thrive even in drier periods.

Livestock farming is another key element of Peshawar's agricultural sector. The district is home to various types of livestock, including buffaloes, cattle, goats, sheep, mules, and horses. These animals are an essential source of income for rural households, providing dairy products, meat, and labor for agricultural activities. Poultry farming is also a growing industry in Peshawar, with numerous farms spread across the district. Livestock farming complements crop production, as animals are often used in the agricultural process, while livestock waste is used as fertilizer, enhancing soil fertility.

In recent years, Peshawar's agricultural sector has faced challenges, including issues related to water management, crop productivity, and market access. Ensuring food security and controlling food inflation have become primary concerns for policymakers, especially given their role in poverty alleviation efforts. As agriculture is the largest sector contributing to foreign exchange earnings in Pakistan, there is a growing need for a multi-faceted strategy to make this sector more efficient, competitive, and sustainable. Investments in modern

irrigation technologies, improved crop varieties, and better access to markets for both crops and livestock products can enhance Peshawar's agricultural productivity.

In addition to agriculture, Peshawar's economy benefits from other sectors, such as manufacturing, government services, and small-scale industries, which provide employment opportunities for skilled and unskilled labor. The balance between agricultural and industrial development in the district ensures that Peshawar's economy remains diverse and resilient. However, agriculture remains the principal occupation for the rural population, which emphasizes its enduring importance in Peshawar's socio-economic fabric.

13.1. Agriculture Proposals

Maintaining a robust agricultural sector is essential for the economic development and food security of Peshawar and its surrounding areas. With agriculture constituting 44.65% of the total land area in Peshawar (43,787.07 acres), it plays a crucial role in supporting local livelihoods, contributing to both food production and the rural economy. The local government, in collaboration with various stakeholders, is tasked with investing in infrastructure, providing education and training, and promoting sustainable farming practices to ensure the long-term viability of the sector. The objective is to establish an agricultural system that is environmentally sound, economically viable, and socially responsible, while being adaptable to future challenges such as climate change and urban expansion.

The proposed Master Plan for Peshawar acknowledges the importance of agriculture by outlining key initiatives aimed at preserving and enhancing this vital sector. As part of the plan, a Reserved Agriculture zone has been proposed over 21,466.5 acres of prime agricultural land. This reserved zone will ensure that crucial farming areas are protected from urban encroachment and non-agricultural development, thus preserving Peshawar's food production capacity and maintaining its green spaces.

In addition to reserving agricultural land, the plan includes the establishment of a Proposed Agriculture Research Center covering 219.75 acres. This center will focus on innovation and education, providing farmers with access to advanced techniques, improved crop varieties, and sustainable farming practices. Research and education will be key components in ensuring that agriculture remains productive and sustainable in the face of environmental and economic challenges. This initiative aligns with the government's goal of promoting sustainable agriculture through investment in technology and research.

The Orchards sector also receives special attention in the proposed plan. Currently, Peshawar has 103.78 acres of orchards, constituting 0.11% of the total agricultural area. To boost fruit production and diversify the agricultural economy, an additional 40.23 acres of orchards have been proposed. Expanding orchards will not only contribute to local food security but will also provide farmers with additional revenue streams, contributing to the economic sustainability of the sector.

Overall, the total proposed agriculture area for Peshawar amounts to 21,726.48 acres, which includes the reserved agriculture land, the agriculture research center, and the proposed orchards. This strategic allocation ensures that key agricultural areas are protected and enhanced while allowing for innovation and diversification in farming practices.

The primary goals for maintaining and enhancing agriculture in Peshawar include improving soil fertility, reducing the use of harmful pesticides and fertilizers, and promoting sustainable farming practices. Key proposals in the Master Plan include:

- Promotion of organic agriculture to reduce environmental impact and improve food quality.
- Encouraging conservation tillage practices and tunnel farming to improve water efficiency and soil health.
- Supporting agroforestry initiatives that integrate trees and shrubs into agricultural landscapes, enhancing biodiversity and providing ecological benefits.
- Investment in research and education through the proposed Agriculture Research Center, which will equip farmers with the knowledge and tools to adopt sustainable practices.
- Provision of incentives and subsidies to farmers, especially in waterlogged and saline areas, to encourage the adoption of water-efficient and drought-resistant crops.
- Community engagement in agriculture, promoting home gardening and community farming to enhance food security at the local level.

Figure 13: Proposed Agricultural Zones

Agriculture

- Existing Area (Acres) = **43,787.07**
- Existing Percentage= **44.65%**
- Reserved Agriculture = **21,466.5 Acres**
- Proposed Agriculture Research Center = **219.75 Acres**

Orchards

- Existing Area (Acres) = **103.78**
- Percentage = **0.11%**
- Proposed Orchards = **40.23** acres

Overall Agriculture

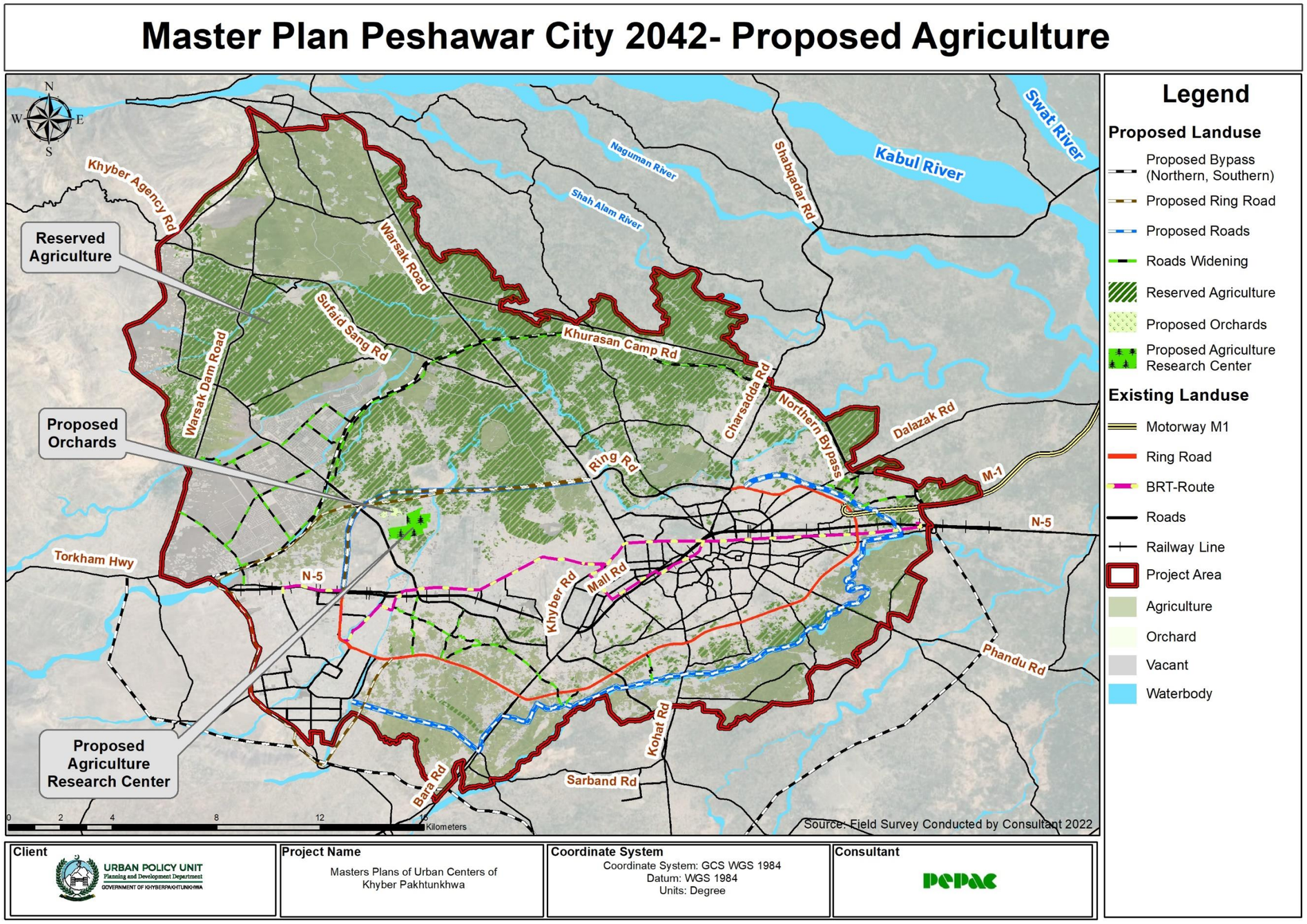
- Total proposed agriculture area (Acres) = **21,726.48 acres**

13.2. Zoning Regulation for Agriculture Land Use

Here are the guidelines developed for agricultural zone development:

Permitted Uses	Allied Permitted Uses	Prohibited Uses
• Develop land use for proposed agriculture in designated areas and prohibit the conversion of agricultural lands to non-agricultural uses. • Incentives for farmers to adopt modern technologies and improve their productivity. • Development of farmer's markets and direct marketing of agricultural products to consumers. • Agricultural research and development.	• Related land activities with respect to its rules and regulations • Agro-processing industries (e.g., food processing, textile manufacturing, etc.) • Renewable energy generation (e.g., solar panels on farms) • Rural tourism (e.g., farm stays, guided tours, etc.) • Forestry and agroforestry • Accommodation for farmers and labor in associations with MC.	• Conversion of agricultural land to non-agricultural uses, e.g. residential, commercial, or industrial development. • Use of harmful agrochemicals or practices that degrade soil quality or pollute water sources. • Cultivation of crops or raising of livestock that are not appropriate for the region or that require excessive amounts of water or other resources. • Any activities that are illegal or harmful to the environment or public health.

Map 25: Reserved Agriculture Map – Peshawar Study Area



Source: Devised by Consusltant

Chapter 14: Transportation and Mobility

The detailed surveys have shown that the local public transportation services of Peshawar were inefficient, unregulated, and under-developed suggesting improvement and integration. Further, since people are widely satisfied with the BRT services and most of the people prefer BRT over local Wagon/Bus to travel to their workplaces, educational facilities, city centre, commercial areas, transit-oriented development through densification appears to be the logical direction of development within the core city. The data has shown that about 44% of daily commuters use BRT and among these commuters, most of them were males which include students, local business owners and 27% skilled workers/ employees such as engineers, lawyers, doctors, and employees of armed forces. This suggested that feeder routes are needed to be determined that connect residential areas to different educational facilities and with the central business and trade zones.

The results of primary survey indicated that low-income or middle-income groups use BRT and they had shown dis-satisfaction with the local public transport services despite high ridership owing to long travel times, compromised safety, difficulty of accessibility, irregularity of the service, and unaffordable travel fares. The mismanagement of local transport requires comprehensive traffic management proposals and policies.

Furthermore, the suggestions from general public came in regard to increasing the number of routes of BRT, increasing accessibility, and widening of roads on feeder routes. The local public transport services are unplanned and are mostly operated on major arteries of city which include pickups and wagons. A gap has been identified during the background study analysis stage between the demand and provision of an efficient and environment friendly public transport system.

In regard to existing roads and traffic situation, severe traffic congestion has been observed on major roads of Peshawar including Nasir Bagh Road, Chamkani Road, Charsadda Road, Palosi Road and the busiest junctions in Peshawar were Jahaz Chowk, Charsadda Road Bus Stop Chowk, Jameel Chowk, FC Chowk, and Chungi Chowk. Traffic congestion problems have been observed on these junctions owing to absence of traffic regulatory infrastructure, lack of implementation and enforcement mechanism by traffic police and lack of respect and awareness among general public for traffic rules.

In light of existing traffic and transportation problems, the following interventions are proposed for improvement of mobility and traffic management in Peshawar.

14.1. Road Proposals

14.1.1. Widening of Existing Roads

The existing traffic condition of Peshawar is very critical. Traffic congestion is very common in peak hours which is a serious issue to be analysed. For this purpose, traffic surveys such as MCC and TMC were conducted, and traffic volumes were obtained for peak and non-peak

hours. The vehicle mix observed on roads were converted to single Passenger Car Units (PCU) to further analyse the traffic conditions. These PCUs are given in table below for each vehicle type.

Table 39: PCU Factors by JICA

Vehicle Type	PCU Factors	Vehicle Type	PCU Factors
Truck	3	Car	1
Bus	3	Auto-Rickshaw	0.75
Minibus	3	Motorcycle	0.75
Utility	1	Non-Motorized Vehicles	1

Source: Geometric Design of RHD Roads Ver. 4 (JICA)

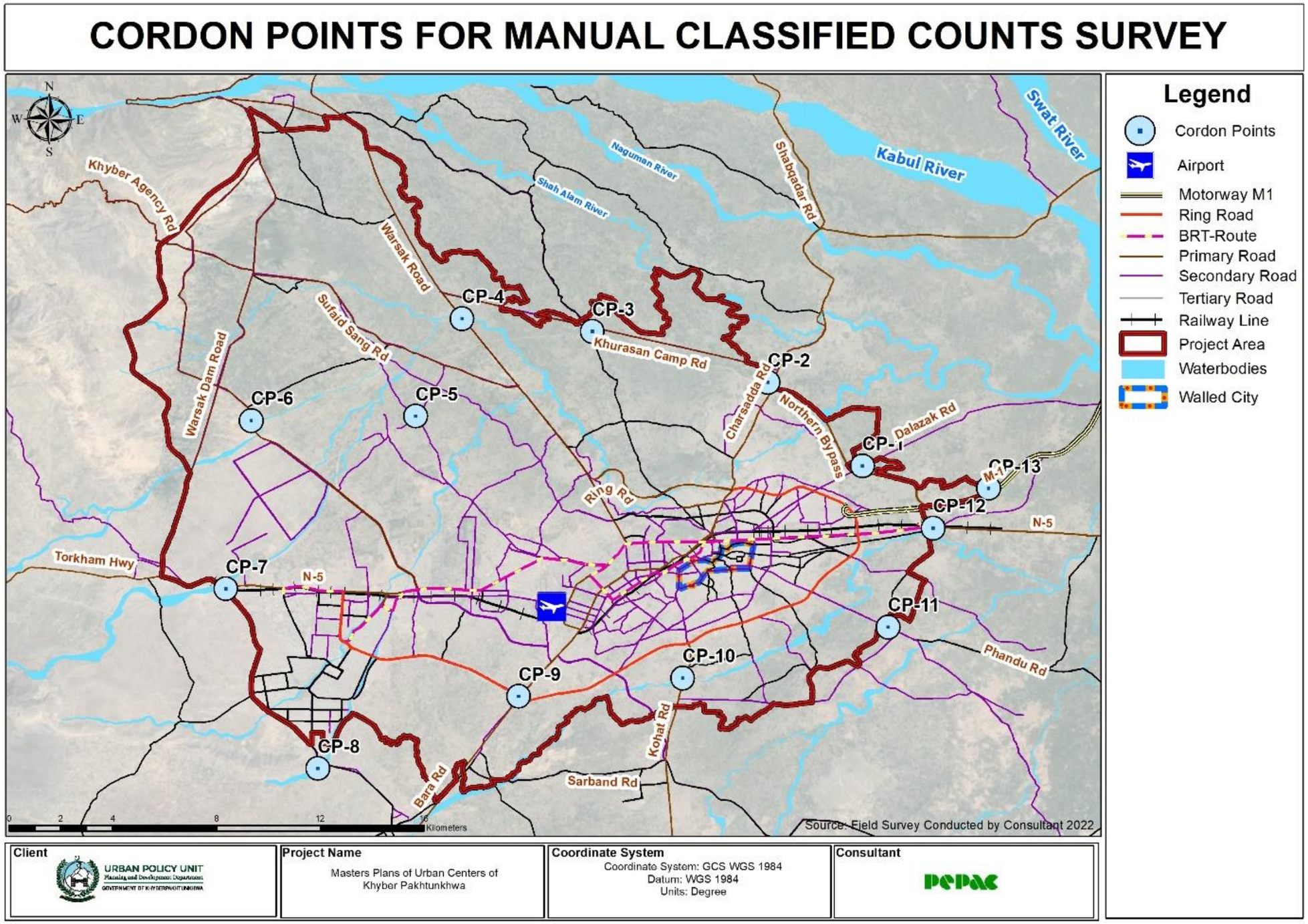
Level of Service (LOS) of road represents the quality of road in terms of no. of vehicles flowing smoothly through it in one hour. To determine LOS of roads, the volume and capacity analysis is performed according to Highway Capacity Manual's criteria as shown in table below

Table 40: LOS Criteria of HMC for Capacity Analysis

LOS Criteria for Volume/Capacity (V/C) Analysis	
V/C Ratio	LOS
0.00-0.60	A
0.60-0.70	B
0.70-0.80	C
0.80-0.90	D
0.90-1.00	E
> 1.00	F

Source: Highway Capacity Manual, Transportation research board, 2010.

Map 26: MCC Cordon Points Map



Source: Devised by Consultant

The existing volume on 13 major roads in Peshawar were analyzed by comparing volume and capacity ratio and its LOS were determined with current geometry. Most of the roads have an LOS of 'A' with current geometry and existing volume. Some of the roads have a lower LOS such as:

LOS F: Kohat Road for Inflow Traffic

LOS C: Palosi Road for Inflow Traffic

Now, to determine the LOS of these roads with future demand, the traffic volume projection for future is done by taking 5% growth rate from vehicle registration trend as mentioned in Background Survey Report (BSR).

Two scenarios are discussed for comparison.

i. Future traffic demand with current geometry
ii. Future traffic demand with interventions (improved geometry)

The results for 13 roads with their respective traffic volumes, peak hours and required interventions to improve the LOS in 2042 as shown in the following table.

Table 41: Manual Classified Count results for Future Scenario

Cordon Point	Cordon Point ID	Direction	Duration	Current Demand with Existing Geometry - 2022					Future Demand with Existing Geometry - 2042					Future Demand with Interventions - 2042					Remarks
				Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Proposed No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	
Chamkani Road	CP-1	Inflow	AM	3	4800	2316	0.48	A	3	4800	5574	1.16	F	4	6400	5574	0.87	D	1 additional lane required in Westbound approach for smooth flow of traffic
			PM	3	4800	2309	0.48	A	3	4800	5556	1.16	F	4	6400	5556	0.87	D	
		Outflow	AM	3	4800	2576	0.54	A	3	4800	6199	1.29	F	5	8200	6199	0.76	C	2 additional lanes required in Eastbound approach for smooth flow of traffic
			PM	3	4800	2819	0.59	A	3	4800	6783	1.41	F	5	8200	6783	0.83	D	
Dalazak Road	CP-2	Inflow	AM	2	3200	676	0.21	A	2	3200	1627	0.51	A	2	3200	1627	0.51	A	LOS is fine in future with current lane configuration for Westbound approach. So, no Interventions required
			PM	2	3200	979	0.31	A	2	3200	2355	0.74	C	2	3200	2355	0.74	C	
		Outflow	AM	2	3200	547	0.17	A	2	3200	1316	0.41	A	2	3200	1316	0.41	A	LOS is fine in future with current lane configuration for Eastbound approach. So, no Interventions required
			PM	2	3200	681	0.21	A	2	3200	1638	0.51	A	2	3200	1638	0.51	A	
Charsadda Road	CP-3	Inflow	AM	3	4800	2487	0.52	A	3	4800	5985	1.25	F	4	6400	5985	0.94	E	1 additional lane is required in Westbound approach for smooth flow of traffic
			PM	3	4800	1753	0.37	A	3	4800	4218	0.88	D	4	6400	4218	0.66	B	
		Outflow	AM	3	4800	1114	0.23	A	3	4800	2680	0.56	A	3	4800	2680	0.56	A	LOS is fine in future with current lane configuration. So,no interventions are required
			PM	3	4800	1614	0.34	A	3	4800	3885	0.81	D	3	4800	3885	0.81	D	
Pajaggi Road	CP-4	Inflow	AM	1	1600	909	0.57	A	1	1600	2186	1.37	F	2	3200	2186	0.68	B	1 additional lane required in Southbound approach for smooth flow of traffic
			PM	1	1600	728	0.45	A	1	1600	1751	1.09	F	2	3200	1751	0.55	A	
		Outflow	AM	1	1600	948	0.59	A	1	1600	2281	1.43	F	2	3200	2281	0.71	C	1 additional lane required in Northbound approach for smooth flow of traffic
			PM	1	1600	699	0.44	A	1	1600	1683	1.05	F	2	3200	1683	0.53	A	
Warasak Road	CP-5	Inflow	AM	2	3200	1701	0.53	A	2	3200	4095	1.28	F	3	4800	4095	0.85	D	1 additional lane required in Westbound approach for smooth flow of traffic
			PM	2	3200	1281	0.40	A	2	3200	3084	0.96	E	3	4800	3084	0.64	B	
		Outflow	AM	2	3200	882	0.28	A	2	3200	2123	0.66	B	2	3200	2123	0.66	B	LOS is fine in future with current lane configuration. So, no interventions are required
			PM	2	3200	806	0.25	A	2	3200	1939	0.61	B	2	3200	1939	0.61	B	
Palosi Road	CP-6	Inflow	AM	1	1600	1130	0.71	C	1	1600	2719	1.70	F	2	3200	2719	0.85	D	1 additional lane is required in Southbound approach for smooth flow of traffic
			PM	1	1600	1188	0.74	C	1	1600	2859	1.79	F	2	3200	2859	0.89	D	
		Outflow	AM	1	1600	653	0.41	A	1	1600	1572	0.98	E	2	3200	1572	0.49	A	1 additional lane is required in Northbound approach for smooth flow of traffic
			PM	1	1600	1090	0.68	B	1	1600	2623	1.64	F	2	3200	2623	0.82	D	
	CP-7	Inflow	AM	2	3200	901	0.28	A	2	3200	2169	0.68	B	2	3200	2169	0.68	B	

Cordon Point	Cordon Point ID	Direction	Duration	Current Demand with Existing Geometry - 2022					Future Demand with Existing Geometry - 2042					Future Demand with Interventions - 2042					Remarks
				Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Proposed No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	
Nasir Bagh Road			PM	2	3200	1166	0.36	A	2	3200	2807	0.88	E	2	3200	2807	0.88	D	LOS is fine in future with current lane configuration for Eastbound approach. So, no Interventions required
		Outflow	AM	2	3200	777	0.24	A	2	3200	1870	0.58	A	2	3200	1870	0.58	A	LOS is fine in future with current lane configuration for Westbound approach. So, no Interventions required
			PM	2	3200	961	0.30	A	2	3200	2314	0.72	C	2	3200	2314	0.72	C	
Jamrud Road	CP-8	Inflow	AM	2	3200	1423	0.44	A	2	3200	3425	1.07	F	3	4800	3425	0.71	C	1 additional lane required in Eastbound approach for smooth flow of traffic
			PM	2	3200	1485	0.46	A	2	3200	3573	1.12	F	3	4800	3573	0.74	C	
		Outflow	AM	2	3200	1844	0.58	A	2	3200	4437	1.39	F	4	6400	4437	0.69	B	2 additional lanes required in Westbound approach for smooth flow of traffic
			PM	2	3200	1966	0.61	A	2	3200	4731	1.48	F	4	6400	4731	0.74	C	
Bara Road	CP-9	Inflow	AM	2	3200	640	0.20	A	2	3200	1541	0.48	A	2	3200	1541	0.48	A	LOS is fine in future with current lane configuration for Northbound approach. So, no Interventions required
			PM	2	3200	777	0.24	A	2	3200	1871	0.58	A	2	3200	1871	0.58	A	
		Outflow	AM	2	3200	974	0.30	A	2	3200	2344	0.73	C	2	3200	2344	0.73	C	LOS is fine in future with current lane configuration for Southbound approach. So, no Interventions required
			PM	2	3200	789	0.25	A	2	3200	1899	0.59	A	2	3200	1899	0.59	A	
Kohat Road	CP-10	Inflow	AM	2	3200	3285	1.03	F	2	3200	7905	2.47	F	5	8200	7905	0.96	E	3 additional lanes required in Northbound approach for smooth flow of traffic
			PM	2	3200	3301	1.03	F	2	3200	7944	2.48	F	5	8200	7944	0.97	E	
		Outflow	AM	2	3200	3073	0.96	E	2	3200	7395	2.31	F	5	8200	7395	0.90	E	3 additional lanes required in Southbound approach for smooth flow of traffic
			PM	2	3200	2974	0.93	E	2	3200	7158	2.24	F	5	8200	7158	0.87	D	
Phandu Road	CP-11	Inflow	AM	2	3200	1842	0.58	A	2	3200	4434	1.39	F	4	6400	4434	0.69	B	2 additional lanes required in Westbound approach for smooth flow of traffic
			PM	2	3200	2203	0.69	B	2	3200	5301	1.66	F	4	6400	5301	0.83	D	
		Outflow	AM	2	3200	1560	0.49	A	2	3200	3754	1.17	F	3	4800	3754	0.78	C	1 additional lane required in Eastbound approach for smooth flow of traffic
			PM	2	3200	1230	0.38	A	2	3200	2960	0.93	E	3	4800	2960	0.62	B	
Hayatabad-Bara Road	CP-12	Inflow	AM	1	1600	607	0.38	A	1	1600	1461	0.91	E	1	1600	1461	0.91	E	LOS is fine in future with current lane configuration at Northbound. So, no interventions required
			PM	1	1600	617	0.39	A	1	1600	1486	0.93	E	1	1600	1486	0.93	E	
		Outflow	AM	1	1600	450	0.28	A	1	1600	1082	0.68	B	1	1600	1082	0.68	B	LOS is fine in future with current lane configuration at Southbound. So, no interventions required
			PM	1	1600	430	0.27	A	1	1600	1034	0.65	B	1	1600	1034	0.65	B	
	CP-13	Inflow	AM	3	4800	770	0.16	A	3	4800	1853	0.39	A	3	4800	1853	0.39	A	

Cordon Point	Cordon Point ID	Direction	Duration	Current Demand with Existing Geometry - 2022					Future Demand with Existing Geometry - 2042					Future Demand with Interventions - 2042					Remarks
				Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Existing No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	Proposed No. of Lanes	Road Capacity (pcu/hr) C	Peak Hour Volume (pcu) V	V/C Ratio	LOS	
Motorway Toll Palaza			PM	3	4800	787	0.16	A	3	4800	1894	0.39	A	3	4800	1894	0.39	A	LOS is fine in future with current lane configuration for Westbound approach. So, no Interventions required
		Outflow	AM	3	4800	764	0.16	A	3	4800	1839	0.38	A	3	4800	1839	0.38	A	LOS is fine in future with current lane configuration for Eastbound approach. So, no Interventions required
			PM	3	4800	814	0.17	A	3	4800	1959	0.41	A	3	4800	1959	0.41	A	

Source: Devised by Consultant

After determining the LOS of these roads with current geometry and future traffic demand, most of the roads were failing with an LOS 'F' as shown in table below. This means that severe traffic congestion will be observed on these roads if current geometry of these roads is not improved. Therefore, additional lanes (12-ft wide, each lane) are provided to improve LOS of these roads. These roads are listed below and their total lanes required in future with direction, and improved LOS is highlighted in the table above:

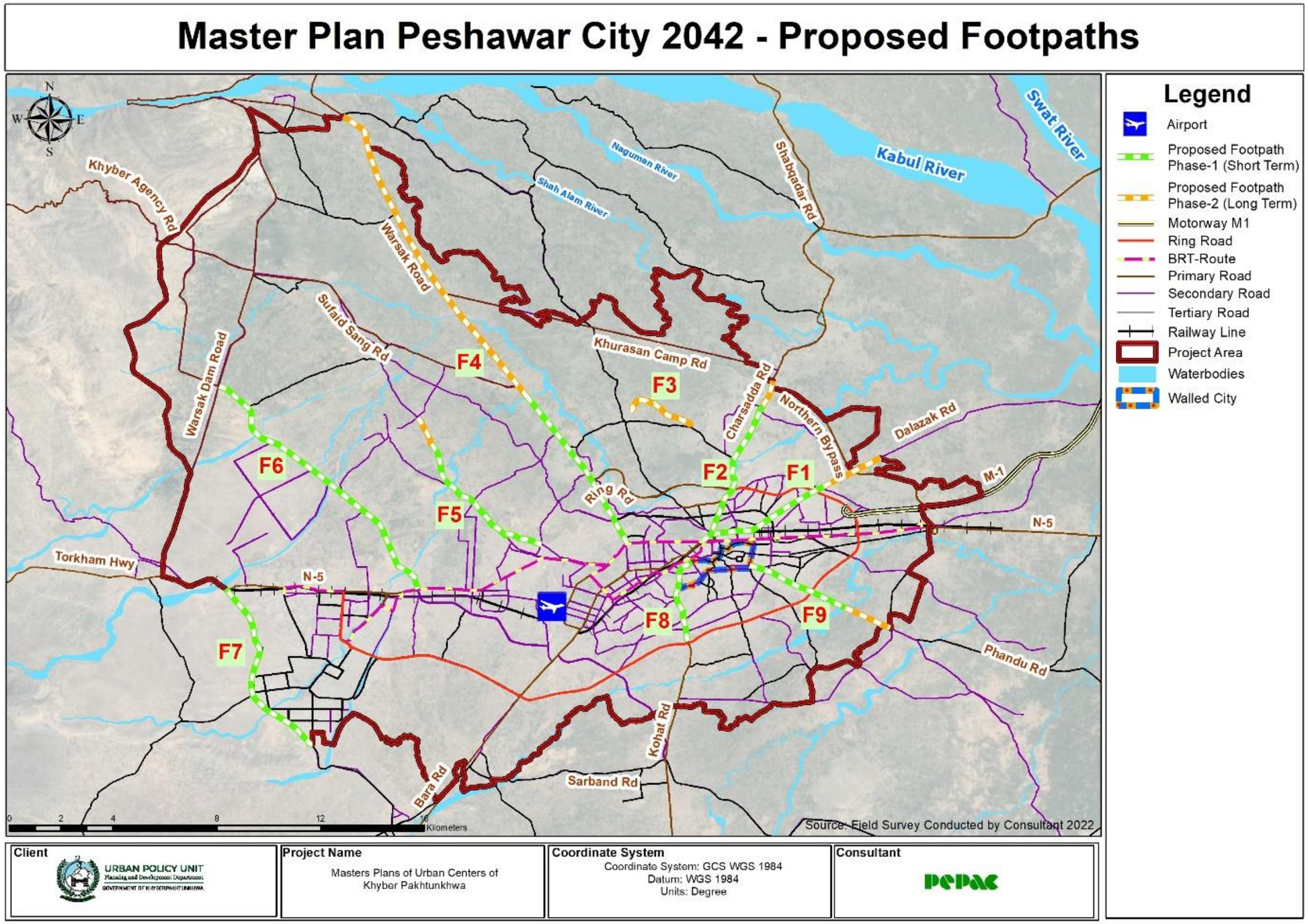
- Chamkani road
- Charsadda road
- Pajjagi road
- Warsak road
- Palosi Road
- Kohat Road
- Phandu Road
- Bara Road

Similarly, the following roads shall be improved by providing a footpath to aid pedestrian movement. Footpaths are Proposed in 2 Phases: Phase-I for the short term Basis Implementing within the Neighborhood Council (NC) Boundary and phase 2 targets for the linger run extending to the Project area Boundary. Another Way to Promote Active/Green Transportation is to Provide City Wide Bicycles/E-Bikes Stands from people can rent out Bicycles/E-Bikes for short trips (Separate Lanes/Footpaths can be used). This will add on to both transportation (removing congestion) ultimately to the environment (Removing Pollution).

Table 42:Proposed footpaths along major roads of Peshawar

Sr. No.	Roads	Footpath Availability (Existing)	Footpath Availability (Proposed)
1	Dalazakh Road	No	Yes
2	Charsadda Road	No	Yes
3	Pajjagi Road	No	Yes
4	Warsak Road	No	Yes
5	Palosi Road	No	Yes
6	Nasir Bagh Road	No	Yes
7	Bara Road	No	Yes
8	Kohat Road	No	Yes
9	Phandu Road	No	Yes

Map 27: Newly Proposed Foot Paths Map



Source: Devised by Consultant

14.1.2.Newly Proposed Roads

For the smooth traffic operations within the future extension areas, some road infrastructure improvements are proposed. These improvements are crucial to streamline traffic from the extension areas towards the central city. Therefore, major proposals are listed below as well as explained in detail in the table below with coordinates, length, and other geometric properties.

- Extension of Ring Road on westward side from Warsak Road to N-5
- Proposed primary road (P3), along the boundary of study area, connecting Hayatabad all the way with Farhab Colony and ending at Ring Road.
- Widening of existing primary and secondary roads within the proposed commercial and residential area for smooth traffic flow.
- Complete regulatory, informational, and directional signage to be installed along newly proposed roads.

These roads are also shown in Mobility map attached in section: “Improvement of Public transport services”.

Table 43 Newly proposed roads in the future extended areas

Road	Coordinates		Road ID	Length (km)	Main Carriageway (ft)	Main Carriageway Lanes - Each Side		Center Median (ft)	Service Lanes - Each Side		Side Median - Each Side (ft)	Side Walk - Each Side (ft)	Brown Area - Each Side (ft)
	Start Point	End Point				No. of Lanes	Lane Width (ft)		No. of Lanes	Lane Width (ft)			
Ring Road (Extension)	34°02'08.94"N 71°31'46.39"E	33°59'51.10"N 71°26'38.00"E	RR	10.86	140	3	12	6	1	16	12	N / A	3
Primary Road	34°01'59.79"N 71°34'59.52"E	33°57'32.18"N 71°26'50.05"E	P3	30.89	80	2	12	10	N / A	N / A	N / A	12	N / A

Source: Devised by Consultant

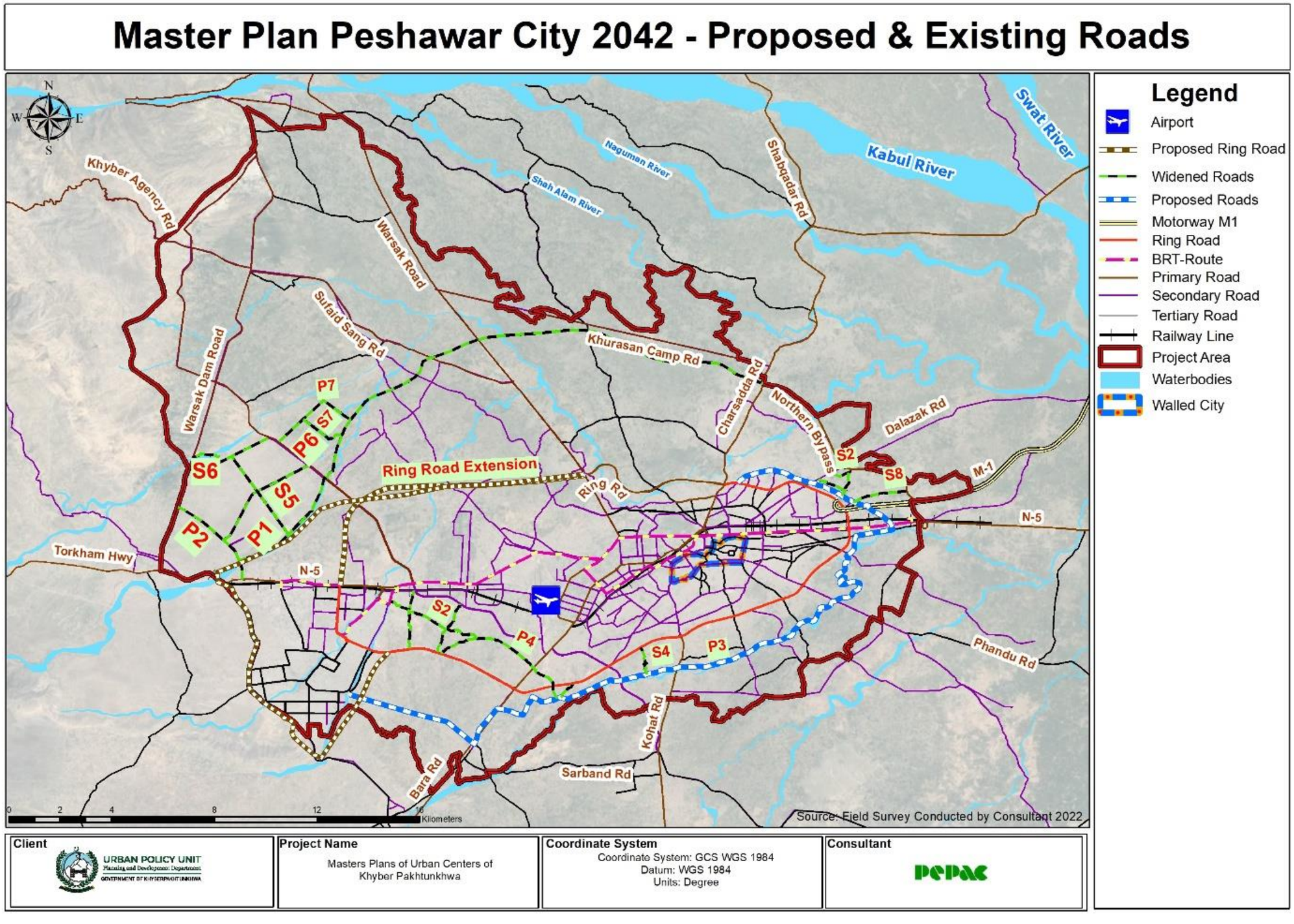
Table 44: Improvement of existing roads to be widened within the future extended area

Road	Situation	Coordinates		Road ID	Length (km)	Main Carriageway (ft)	Main Carriageway Lanes - Each Side		Center Median (ft)	Service Lanes - Each Side		Side Median - Each Side (ft)	Side Walk - Each Side (ft)	Brown Area - Each Side (ft)
		Start Point	End Point				No. of Lanes	Lane Width (ft)		No. of Lanes	Lane Width (ft)			
Primary Road	Existing (Widening required)	33°59'57.72"N 71°24'34.55"E	34°04'59.68"N 71°29'32.14"E	P1	22.85	80	2	12	10	N / A	N / A	N / A	12	N / A
		34°00'21.42"N 71°24'30.35"E	34°01'28.75"N 71°23'12.69"E	P2	2.93	80	2	12	10	N / A	N / A	N / A	12	N / A
	Existing (Widening required)	33°57'26.97"N 71°31'11.53"E	33°58'24.41"N 71°28'45.06"E	P4	5.18	80	2	12	10	N / A	N / A	N / A	12	N / A
		33°58'25.64"N 71°28'40.59"E	33°59'26.92"N 71°29'08.68"E	P5	2.11	80	2	12	10	N / A	N / A	N / A	12	N / A
		34°00'47.26"N 71°24'10.87"E	34°02'20.72"N 71°25'57.68"E	P6	4.13	100	2	12	24	1	12	2	N / A	N / A
		34°02'50.97"N 71°25'20.90"E	34°03'18.74"N 71°26'50.77"E	P7	3.31	100	2	12	24	1	12	2	N / A	N / A
Secondary Road	Existing (Widening required)	33°58'30.13"N 71°28'05.25"E	33°59'43.68"N 71°28'11.02"E	S1	2.32	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		33°58'42.74"N 71°29'30.38"E	33°59'29.70"N 71°27'41.74"E	S2	3.54	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		33°57'28.92"N 71°31'16.39"E	33°57'45.87"N 71°31'31.56"E	S3	0.68	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		33°57'57.97"N 71°33'05.10"E	33°58'31.09"N 71°32'56.81"E	S4	1.16	50	2	12	2	N / A	N / A	N / A	N / A	N / A

Road	Situation	Coordinates		Road ID	Length (km)	Main Carriageway (ft)	Main Carriageway Lanes - Each Side		Center Median (ft)	Service Lanes - Each Side		Side Median - Each Side (ft)	Side Walk - Each Side (ft)	Brown Area - Each Side (ft)
		Start Point	End Point				No. of Lanes	Lane Width (ft)		No. of Lanes	Lane Width (ft)			
		34°00'54.26"N 71°25'32.77"E	34°02'32.42"N 71°24'20.80"E	S5	3.54	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		34°02'55.39"N 71°25'06.57"E	34°02'30.90"N 71°23'31.97"E	S6	2.92	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		34°03'19.32"N 71°25'51.54"E	33°03'01.02"N 71°26'40.54"E	S7	1.63	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		34°01'35.63"N 71°37'24.45"E	34°01'48.72"N 71°38'31.58"E	S8	1.81	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		34°01'43.02"N 71°37'10.76"E	34°02'13.28"N 71°36'59.31"E	S9	1.69	50	2	12	2	N / A	N / A	N / A	N / A	N / A
		34°01'50.20"N 71°37'12.56"E	34°02'04.17"N 71°36'41.59"E	S10	0.93	50	2	12	2	N / A	N / A	N / A	N / A	N / A

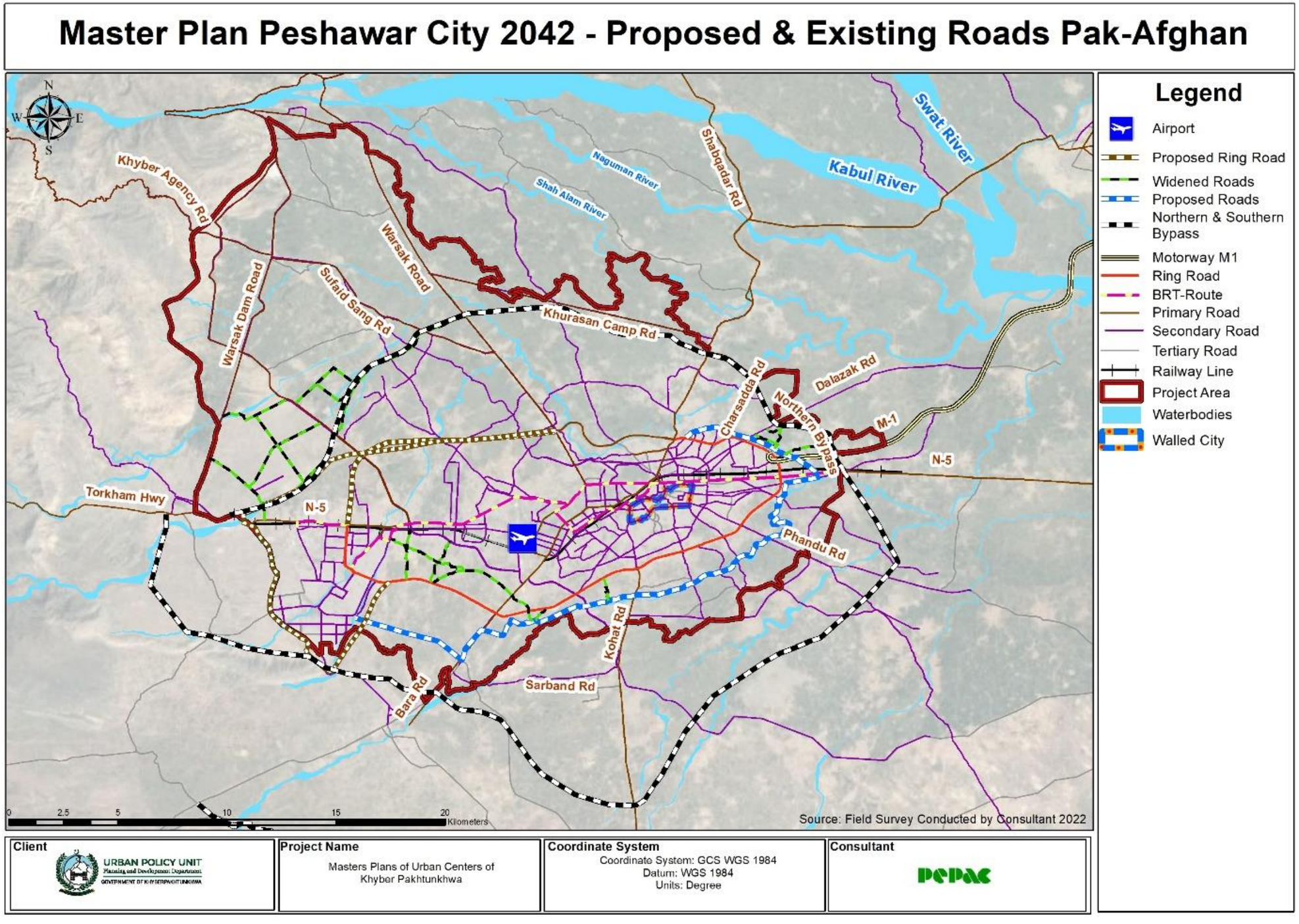
Source: Devised by Consultant

Map 28: Newly Proposed Roads and Widening to Existing Roads



Source: Devised by Consultant

Map 29 : Proposed Roads and Widenings with Already Proposed Regional Connectivity (Northern and Southern Bypass – Pak-Afghan Corridor)



Source: Devised by Consultant

14.2. Proposed Junction Geometry

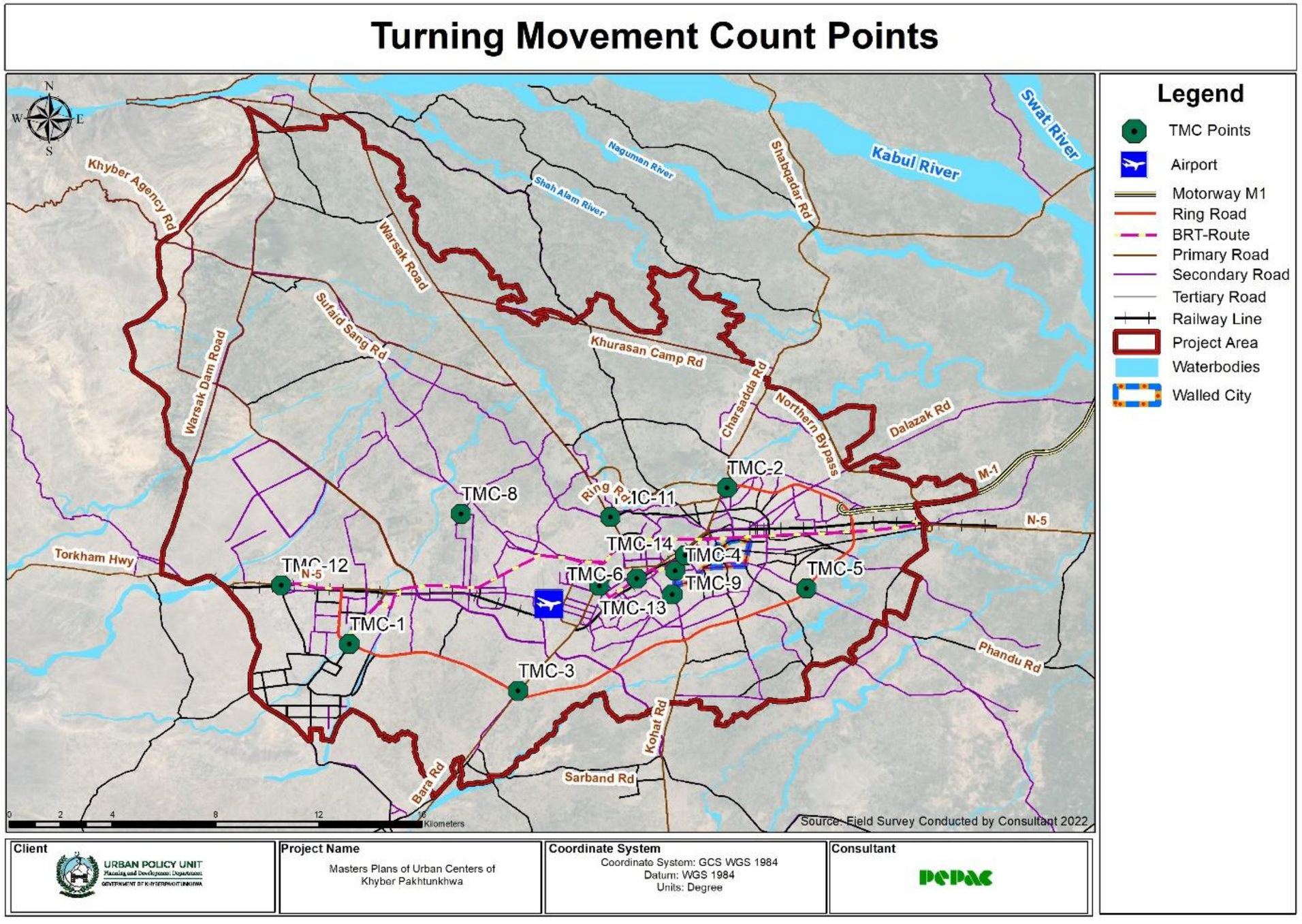
Most of the roads and junctions are extremely congested and proper planning such as improvement of junction and road geometry is required to mobilize the Peshawar city in 2042. The following junctions to be signalized are listed in table below.

Map 30: Selected junctions for improvement in mobility of Peshawar

ID	Junctions Name	Coordinates	Type of Junction (Existing)	Type of Junction (Proposed)
TMC-1	Jahaz Chowk	33°58'40.01"N, 71°26'47.34"E.	Roundabout	Signalized
TMC-2	Charsadda Road Bus Stop Chowk	34° 1'56.03"N, 71°34'41.50"E.	Roundabout	Signalized
TMC-3	Pishtakhara Chowk	33°57'41.52"N, 71°30'19.23"E	Roundabout	Signalized
TMC-4	Dabgari Garden Chowk	35°51’13”N, 71°47’ 12”E.	Unsignalized	Signalized
TMC-5	FC Chowk	34° 0'2.02"N, 71°32'47.87"E	Unsignalized Intersection	Signalized
TMC-6	Palosi Chowk	34° 1'23.36"N, 71°29'7.63"E	Unsignalized Intersection	Signalized
TMC-7	Jameel Chowk	33°59'49.83"N, 71°36'21.38"E	Roundabout	Signalized
TMC-8	Kababian Chowk Warsak	34° 1'19.11"N, 71°32'15.01"E	Unsignalized Intersection	Signalized
TMC-9	Karkhano Chowk	33°59'53.94"N, 71°25'22.15"E	Unsignalized Intersection	Signalized
TMC-10	Chungi Chowk Intersection	33°59'42.41"N, 71°33'32.79"E.	Unsignalized Intersection	Signalized
TMC-11	Peshawar Service Chowk	33°59'52.78"N, 71°32'1.41"E.	Unsignalized Intersection	Signalized
TMC-12	Shuba Bazar Chowk	34° 0'31.34"N, 71°33'49.05"E	Unsignalized	Signalized

Source: Devised by Consultant

Map 31: Turning Movement Count Points



Source: Devised by Consultant

14.2.1.Dabgari Garden Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.1.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 – Left, Through & Right Turns):

Green Time: 22.78 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 25.78 seconds ≈26

West Leg (Phase 2 - Left, Through & Right Turns):

Green Time: 10.85 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 13.85 seconds ≈ 14

East Leg (Phase 3 - Left, Through & Right Turns):

Green Time: 4.44 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 7.44 seconds ≈ 7

North Leg (Phase 4 - Left, Through & Right Turns):

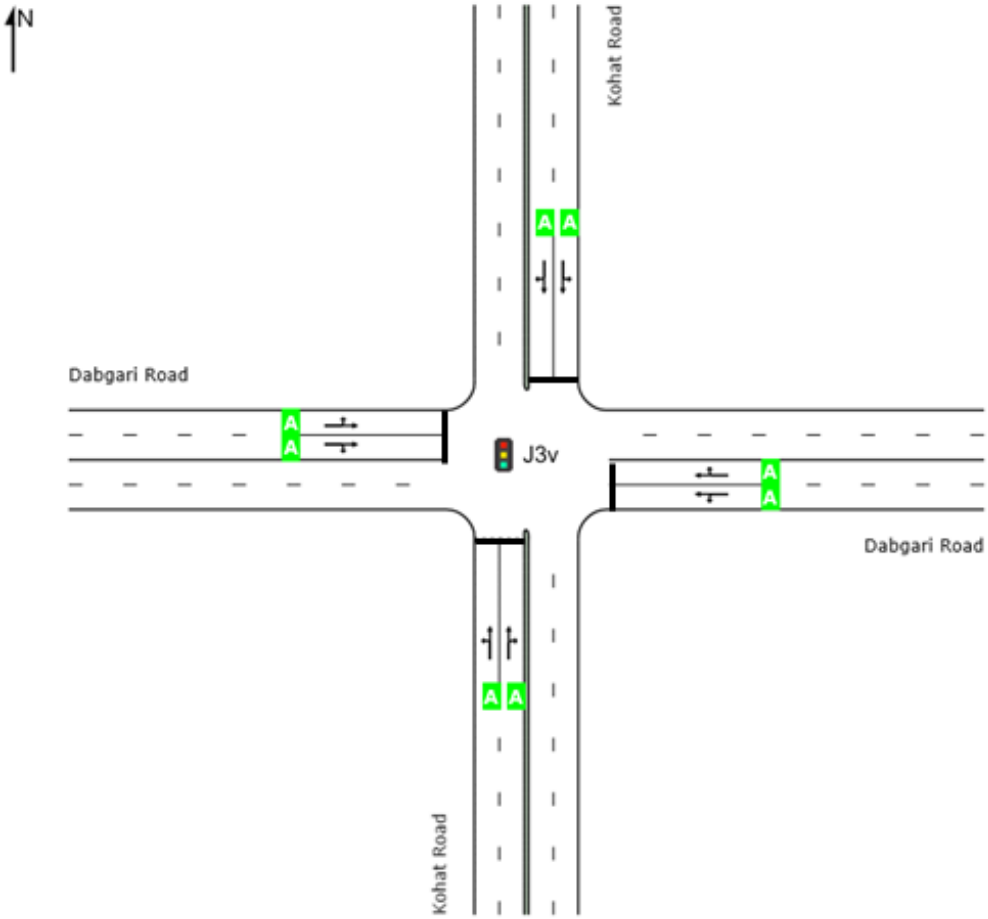
Green Time: 69.91 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 72.91 seconds ≈ 73

The cycle length sums to 26+14+7+73 = 120 seconds

Figure 14: Proposed Pre Timed Signal Timings for Dabgari Garden Chowk



14.2.2.Jahaz Chowk Intersection:

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.2.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 - Left & Right Turns):

Green Time: 25.28 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 28.28 seconds ≈28

West Leg (Phase 2 - Through & Right Turns):

Green Time: 36.56 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 39.56 seconds ≈ 40

East Leg (Phase 3 - Through & Left Turns):

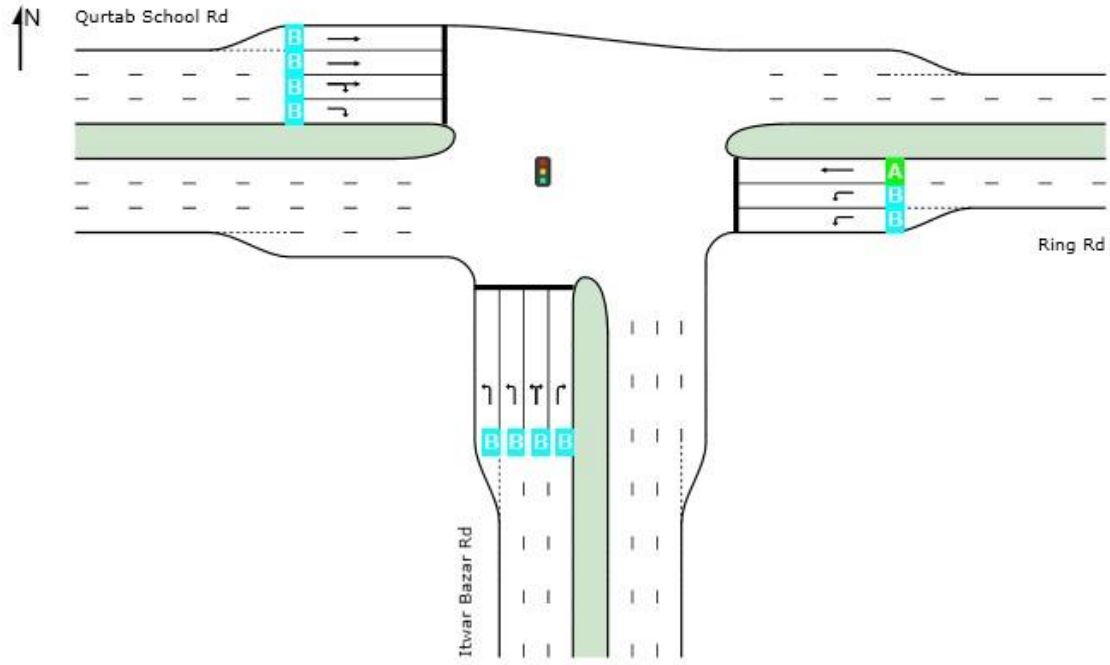
Green Time: 19.14 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 22.14 seconds ≈ 22

The cycle length sums to 28+40+22 = 90 seconds

Figure 15: Proposed Pre Timed Signal Timings for Jahaz Chowk



14.2.3.Charsadda Bus Stop Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.3.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 - Left & Right Turns):

Green Time: 18.16 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 21.16 seconds ≈21

West Leg (Phase 2 - Through & Right Turns):

Green Time: 37.48 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 40.48 seconds ≈ 41

East Leg (Phase 3 - Through & Left Turns):

Green Time: 35.25 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 38.25 seconds ≈ 38

North Leg (Phase 4 - Through & Left Turns):

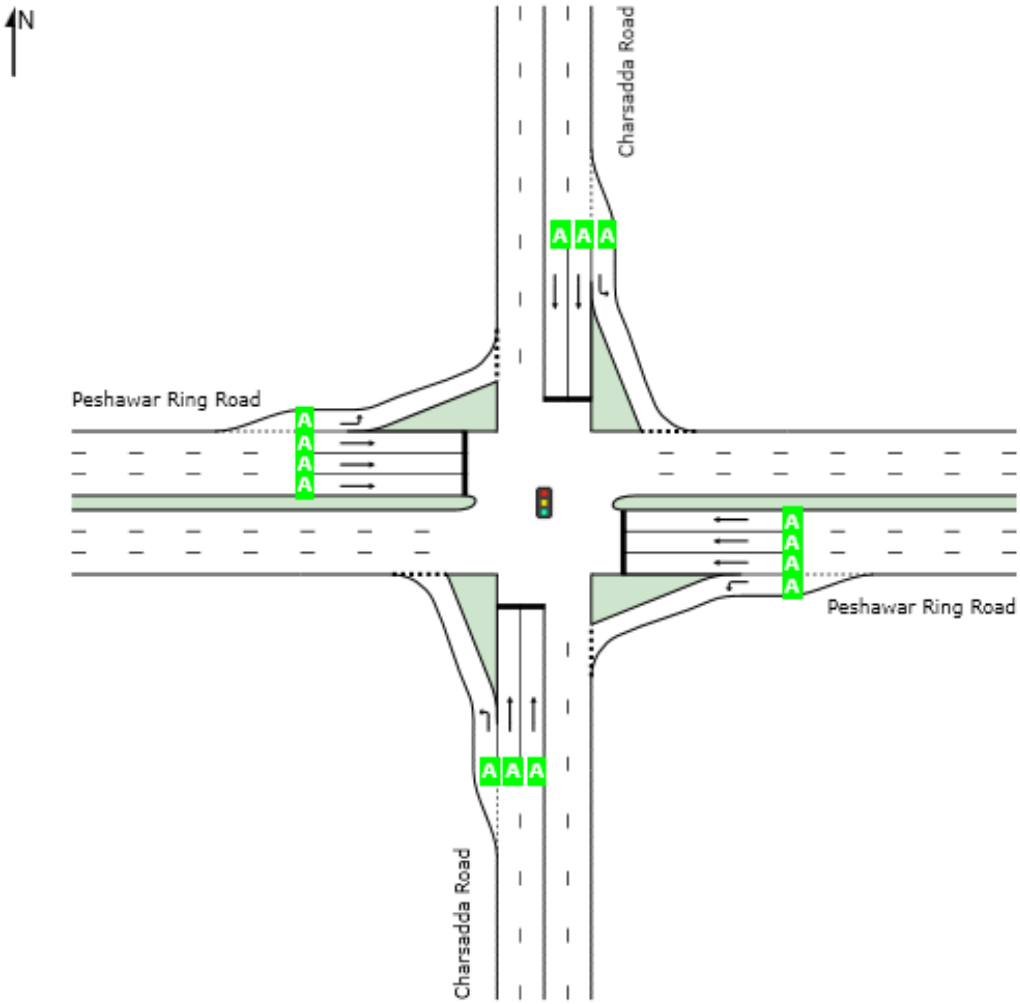
Green Time: 17.10 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 20.10 seconds ≈ 20

The cycle length sums to 21+41+38+20 = 120 seconds

Figure 16: Proposed Pre Timed Signal Timings for Charsadda Bus Stop Chowk



14.2.4.Chungi Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.4.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 - Left & Right Turns):

Green Time: 48.22 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 51.22 seconds ≈51

North East Leg (Phase 2 - Left & Right Turns):

Green Time: 18.34 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 21.34 seconds ≈ 21

North West Leg (Phase 3 - Left & Right Turns):

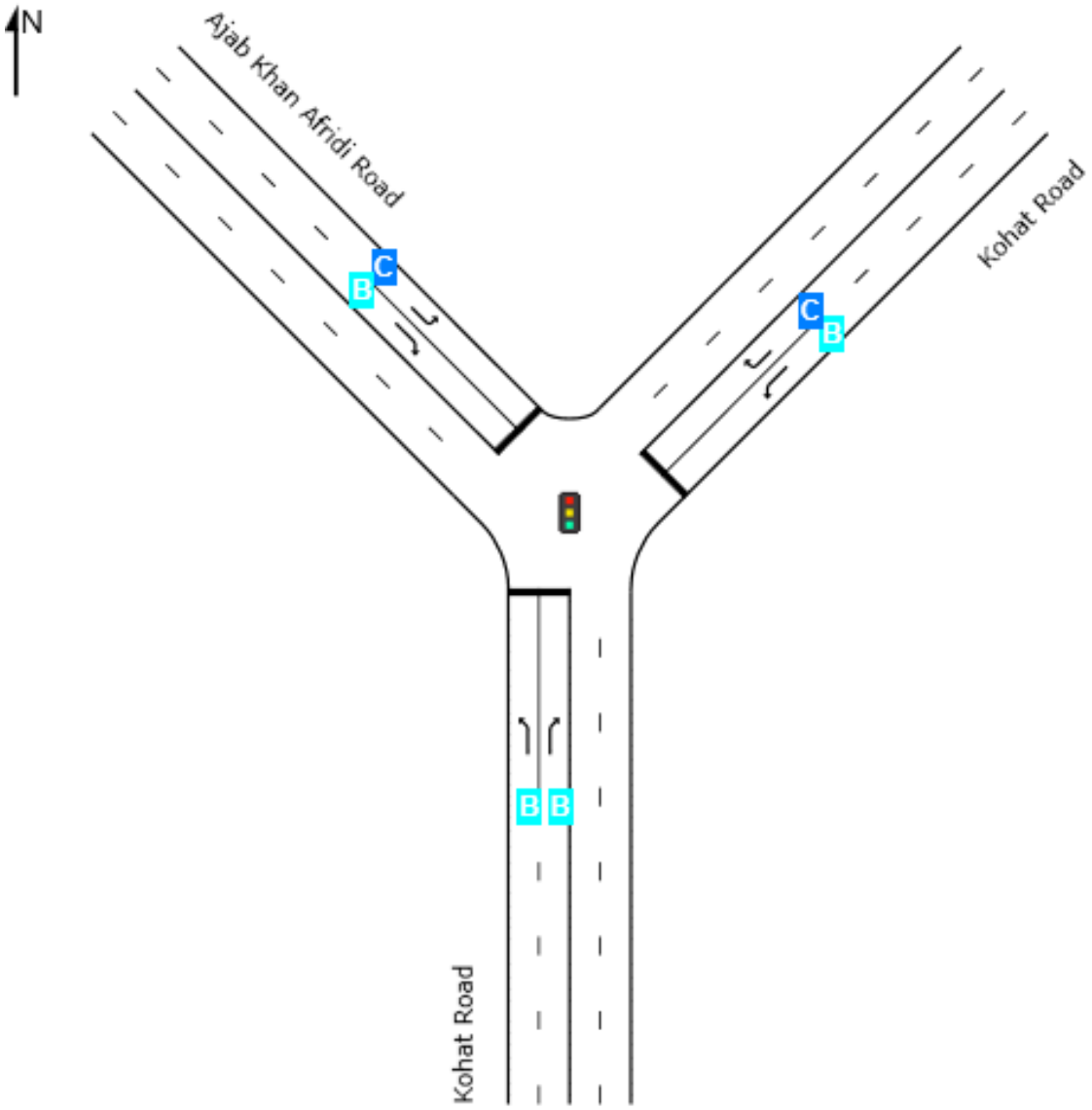
Green Time: 14.42 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 17.42 seconds ≈ 18

The cycle length sums to 51+21+18 = 90 seconds

Figure 17: Proposed Pre Timed Signal Timings for Chungi Chowk



14.2.5.FC Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.5.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South East Leg (Phase 1 – Left, Right & Through Turns):

Green Time: 25.44 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 28.44 seconds ≈ 28

South West Leg (Phase 2 - Left, Right & Through Turns):

Green Time: 21.20 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 24.20 seconds ≈ 24

North East Leg (Phase 3 - Left, Right & Through Turns):

Green Time: 27.85 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 30.85 seconds ≈ 31

North West Leg (Phase 4 - Left, Right & Through Turns):

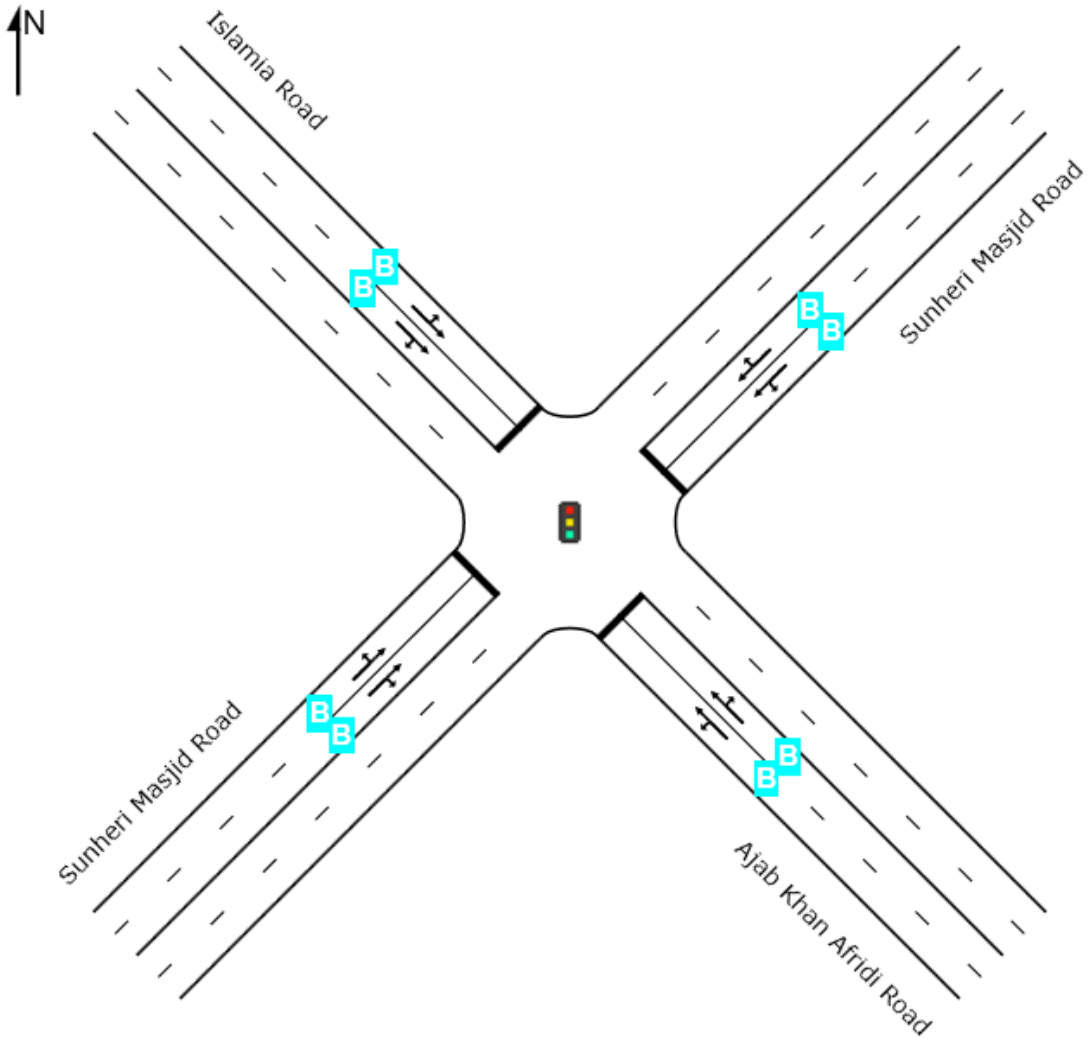
Green Time: 28.49 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 31.49 seconds ≈ 32

The cycle length sums to 28+24+31+32 = 115 seconds, which is consistent with the calculated optimal cycle length.

Figure 18: Proposed Pre Timed Signal Timings for FC Chowk



14.2.6.Jameel Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.6.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 – Left, Through & Right Turns):

Green Time: 43.2 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 46.2 seconds ≈46

West Leg (Phase 2 - Left, Through & Right Turns):

Green Time: 9.30 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 12.30 seconds ≈ 12

East Leg (Phase 3 - Through & Left Turns):

Green Time: 18.33 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 21.33 seconds ≈ 22

North Leg (Phase 4 - Through & Left Turns):

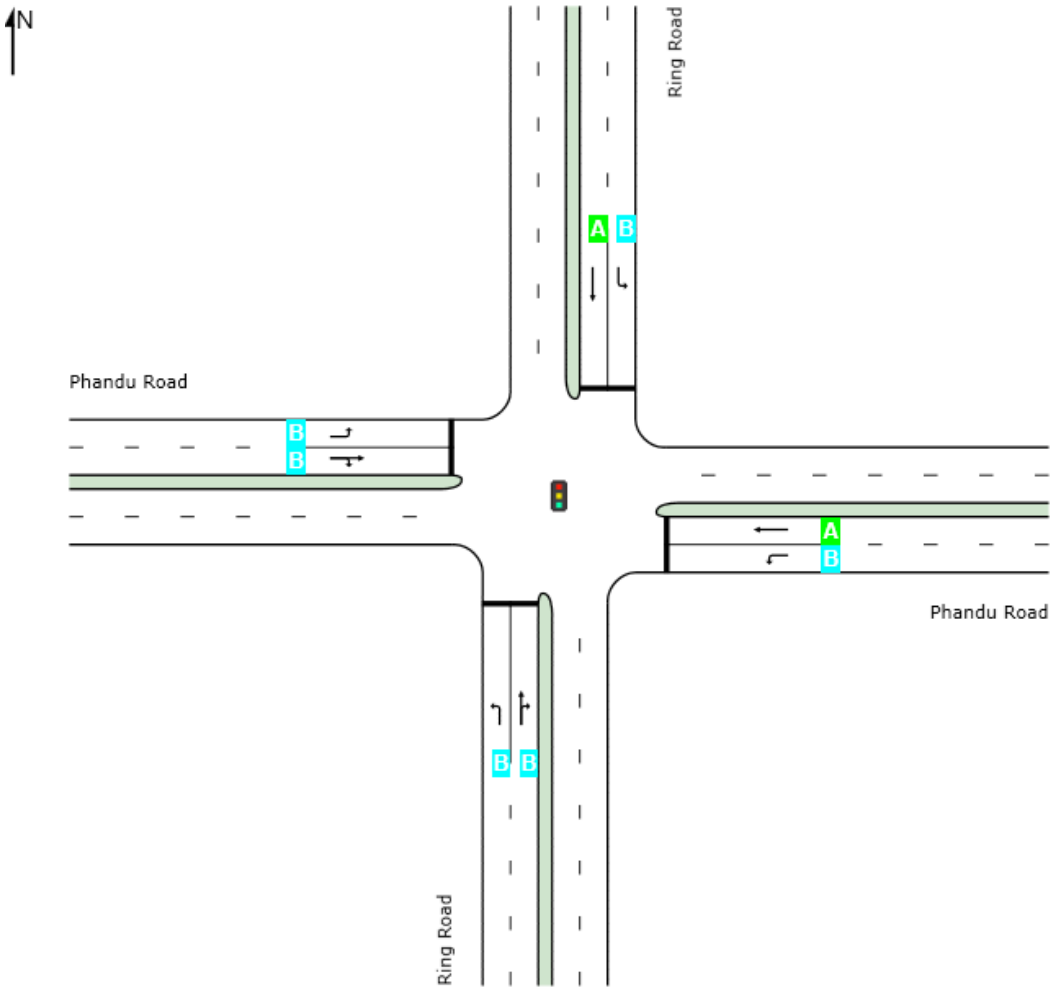
Green Time: 37.16 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 40.16 seconds ≈ 40

The cycle length sums to 46+12+22+40 = 120 seconds

Figure 19: Proposed Pre Timed Signal Timings for Jameel Chowk



14.2.7.Kababian Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count are attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.7.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 – Left, Right & Through Turns):

Green Time: 14.3 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 17.3 seconds ≈ 17

West Leg (Phase 2 - Left, Right & Through Turns):

Green Time: 8.47 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 11.47 seconds ≈ 12

East Leg (Phase 3 - Left, Right & Through Turns):

Green Time: 4.89 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 7.89 seconds ≈ 8

North Leg (Phase 4 - Left, Right & Through Turns):

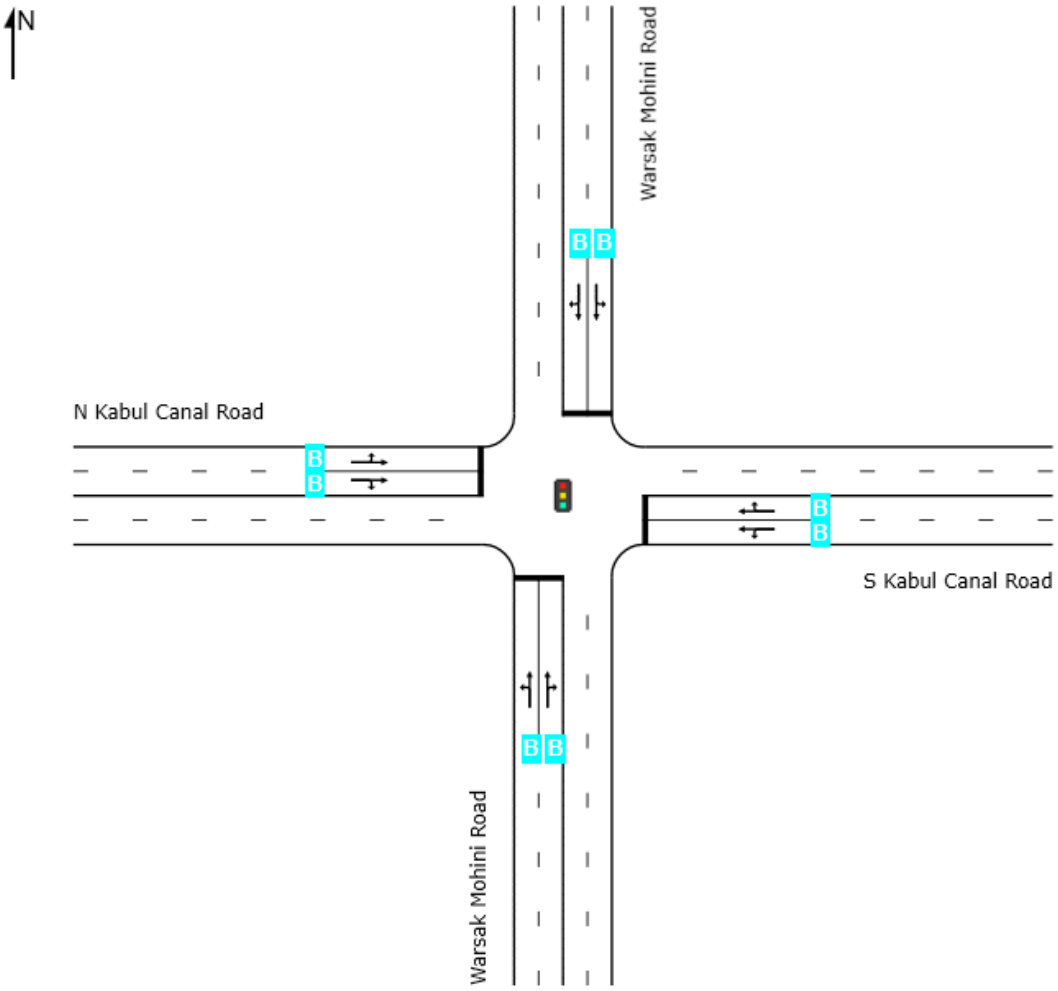
Green Time: 24.25 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 27.25 seconds ≈ 27

The cycle length sums to 17+12+8+27 = 64 seconds, which is consistent with the calculated optimal cycle length.

Figure 20: Proposed Pre Timed Signal Timings for Kababian Chowk



14.2.8.Karkhano Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count is attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.8.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 - Left & Right Turns):

Green Time: 24.33 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 27.33 seconds ≈27

West Leg (Phase 2 - Through & Right Turns):

Green Time: 22.91 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 25.91 seconds ≈ 26

East Leg (Phase 3 - Through & Left Turns):

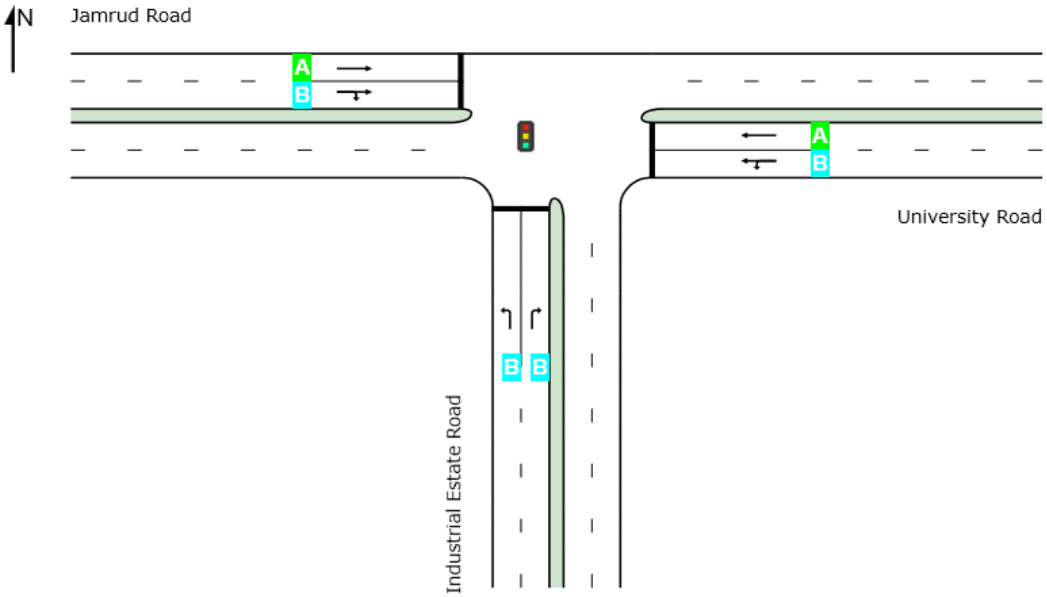
Green Time: 33.74 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 36.74 seconds ≈ 37

The cycle length sums to 27+26+37 = 90 seconds

Figure 21: Proposed Pre Timed Signal Timings for Karkhano Chowk



14.2.9.Palosi Chowk Intersection:

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count is attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.9.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 – Left, Right & Through Turns):

Green Time: 11.07 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 14.07 seconds ≈ 14

West Leg (Phase 2 - Left, Right & Through Turns):

Green Time: 38.5 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 41.5 seconds ≈ 41

East Leg (Phase 3 - Left, Right & Through Turns):

Green Time: 10.71 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 13.71 seconds ≈ 14

North Leg (Phase 4 - Left, Right & Through Turns):

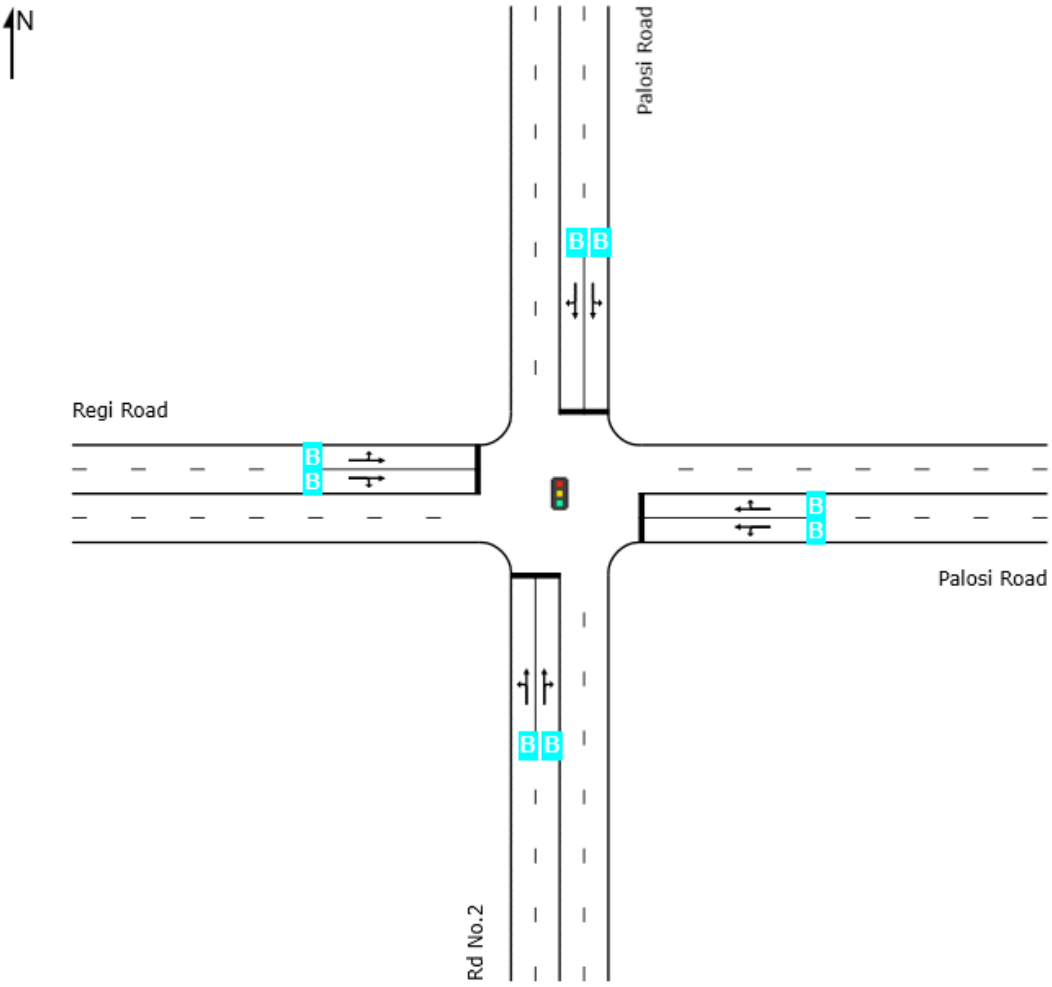
Green Time: 27.71 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 30.71 seconds ≈ 31

The cycle length sums to 14+41+14+31 = 100 seconds, which is consistent with the calculated optimal cycle length.

Figure 22: Proposed Pre Timed Signal Timings for Palosi Chowk



14.2.10. Peshawar Services Chowk:

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count is attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.10.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South East Leg (Phase 1 – Left, Through & Right Turns):

Green Time: 38.76 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 41.76 seconds ≈42

South West Leg (Phase 2 - Left, Through & Right Turns):

Green Time: 25.06 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 28.06 seconds ≈ 28

North East Leg (Phase 3 - Left, Through & Right Turns):

Green Time: 12.21 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 15.21 seconds ≈ 15

North West Leg (Phase 4 - Left, Through & Right Turns):

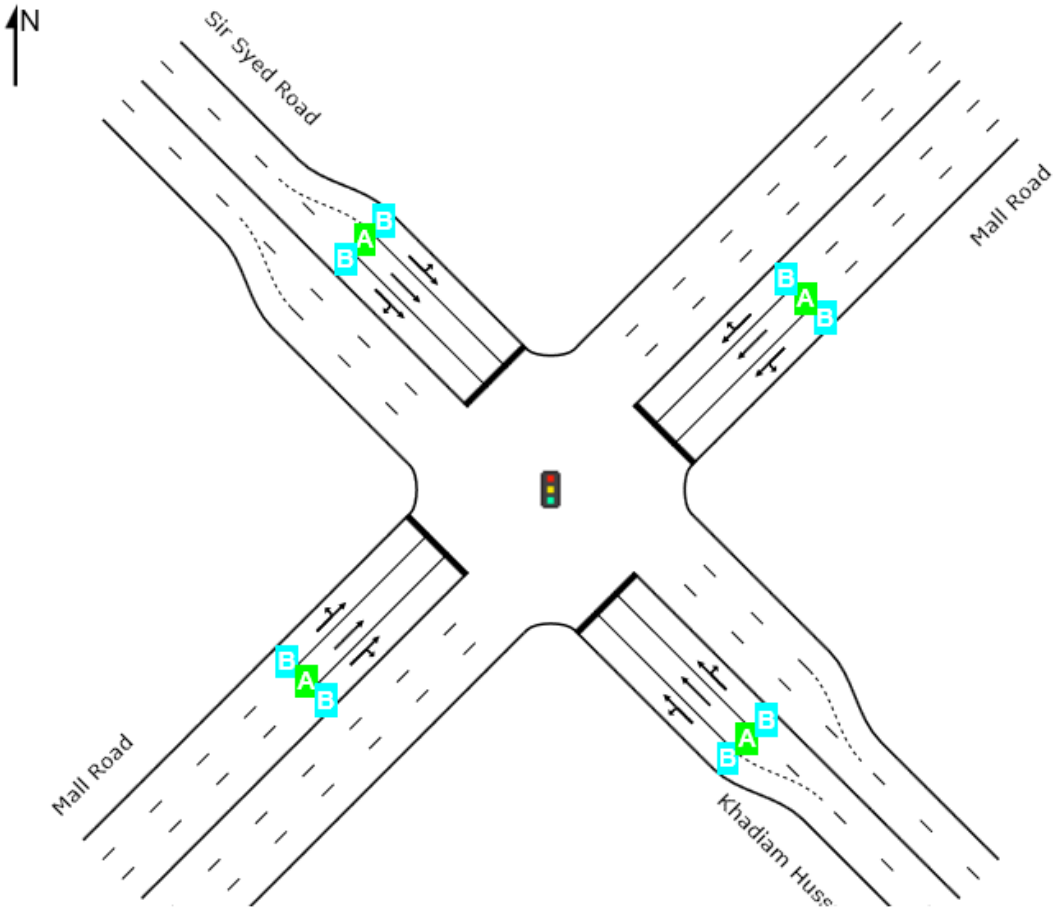
Green Time: 31.95 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 34.95 seconds ≈ 35

The cycle length sums to 42+28+15+35 = 120 seconds

Figure 23:Proposed Pre Timed Signal Timings for Peshawar Services Chowk



14.2.11. Pisthakara Chowk Intersection

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count is attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.11.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South East Leg (Phase 1 – Left, Right & Through Turns):

Green Time: 10.99 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 13.99 seconds ≈ 14

South West Leg (Phase 2 - Left, Right & Through Turns):

Green Time: 11.21 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 14.21 seconds ≈ 14

North East Leg (Phase 3 - Left, Right & Through Turns):

Green Time: 3.53 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 6.53 seconds ≈ 7

North West Leg (Phase 4 - Left, Right & Through Turns):

Green Time: 15.26 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 18.26 seconds ≈ 18

The cycle length sums to 14+14+7+18 = 53 seconds, which is consistent with the calculated optimal cycle length.

Figure 24: Proposed Pre Timed Signal Timings for Pisthakara Chowk

14.2.12. Shubha Chowk Intersection:

The existing and future conditions without intervention in infrastructure and Backend signal timing calculations of Turning Movement count is attached as Annexure-2. The final Pre Timed Signal Timings of TMC for future condition are shown below:

14.2.12.1. Final Proposed Signal Timing

The proposed pre-timed signal timings are:

South Leg (Phase 1 – Left, Through & Right Turns):

Green Time: 28.34 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 31.34 seconds ≈32

West Leg (Phase 2 - Left, Through & Right Turns):

Green Time: 20.19 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 23.19 seconds ≈ 23

East Leg (Phase 3 - Left, Through & Right Turns):

Green Time: 10.24 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 13.24 seconds ≈ 13

North Leg (Phase 4 - Left Turn):

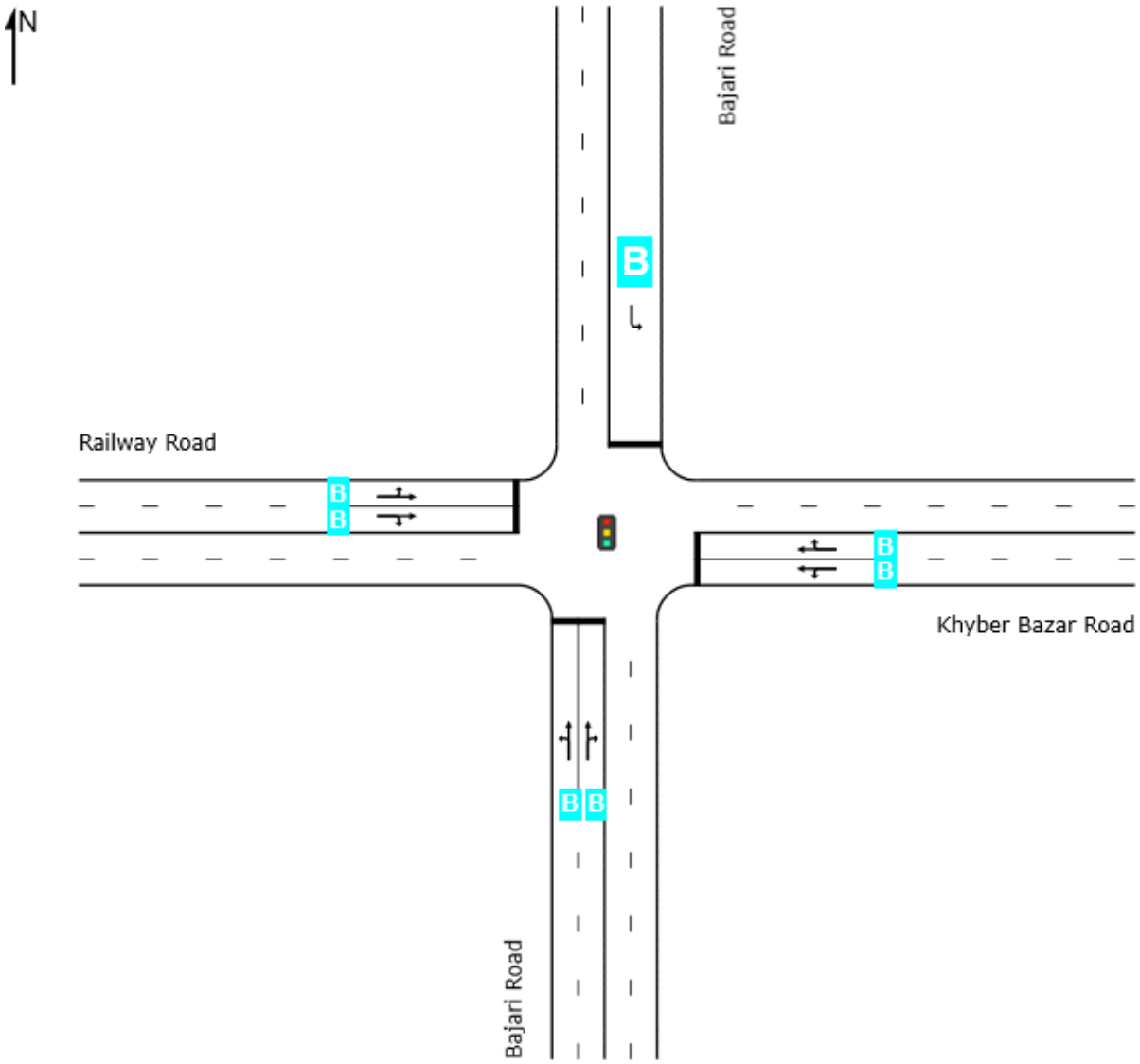
Green Time: 49.21 seconds

Yellow + All-Red Time: 3 seconds

Total Time: 52.21 seconds ≈ 52

The cycle length sums to 32+23+13+52 = 120 seconds

Figure 25: Proposed Pre Timed Signal Timings for Subha Chowk



14.3. Proposed Signage Improvements

The signage inventory along major roads is already shown in existing conditions. There are many junctions and areas where necessary sign boards are missing. If they are provided, the traffic congestion could ease as less people would have to stop and ask about information or direction guidance from other people along the roads. The following table shows the coordinates and type of signs that are currently missing to further assist the movement of people along main roads such as Charsadda Road and Dalazakh Road in Peshawar city. The proposed signage inventory along other roads is mentioned in Appendix-C

Table 45:Proposed signage inventory

Directional Sign (U-Turn Sign) needed: At Charsadda Road Coordinates: 34.052512°N, 71.584532°E	Informational Sign (Bridge Sign) needed: At Charsadda Road Coordinates: 34.036706°, 71.578632°E
Informational Sign (Market Sign) & Regulatory Sign (Slow Speed Sign) needed: At Dalazak Road Coordinates: 34.043216°N, 71.628812°E	Directional Sign (U-Turn Sign) needed: At Dalazak Road Coordinates: 34.038576°, 71.619608°E
Directional Sign (U-Turn Sign) needed: At Dalazak Road Coordinates: 34.038574°N, 71.619608°E	Directional Sign (U-Turn Sign) needed: At Dalazak Road Coordinates: 34.058428°N, 71.512605°E

Source: Devised by Consultant

14.4. Improvement of Public Transport Services

The local public transport services are unregulated and unplanned in Peshawar city. Most common public transport vehicles include Suzuki, Wagon, and mini buses. Most of the people are not satisfied with local public transport vehicles as discussed in existing situation earlier. Therefore, the following proposals shall be implemented to improve the public transportation services in Peshawar.

The local public transport vehicles such as Suzuki, Wagon shall be improved strategically approaching the year 2042 by providing a suitable terminals in future extension area to cater travel demand towards residential, commercial zones, and industrial. The coordinates are listed as:

- Proposed Public Transport Bus Terminal 1: 33°58'6.07"N, 71°30'39.01"E
- Proposed Public Transport Bus Terminal 2: 33°57'51.36"N, 71°32'28.53"E
- Proposed Public Transport Bus Terminal 3: 34°0'39.773"N 71°25'28.064"E

BRT routes should be extended towards the proposed extended area to improve intracity travelling from extended area towards the central city area of Peshawar. The following extension of feeder routes are proposed:

Feeder route extension from Pistakhara Chowk towards southward side along Bara Road to cater travel demands of residential zones R5 and R6.

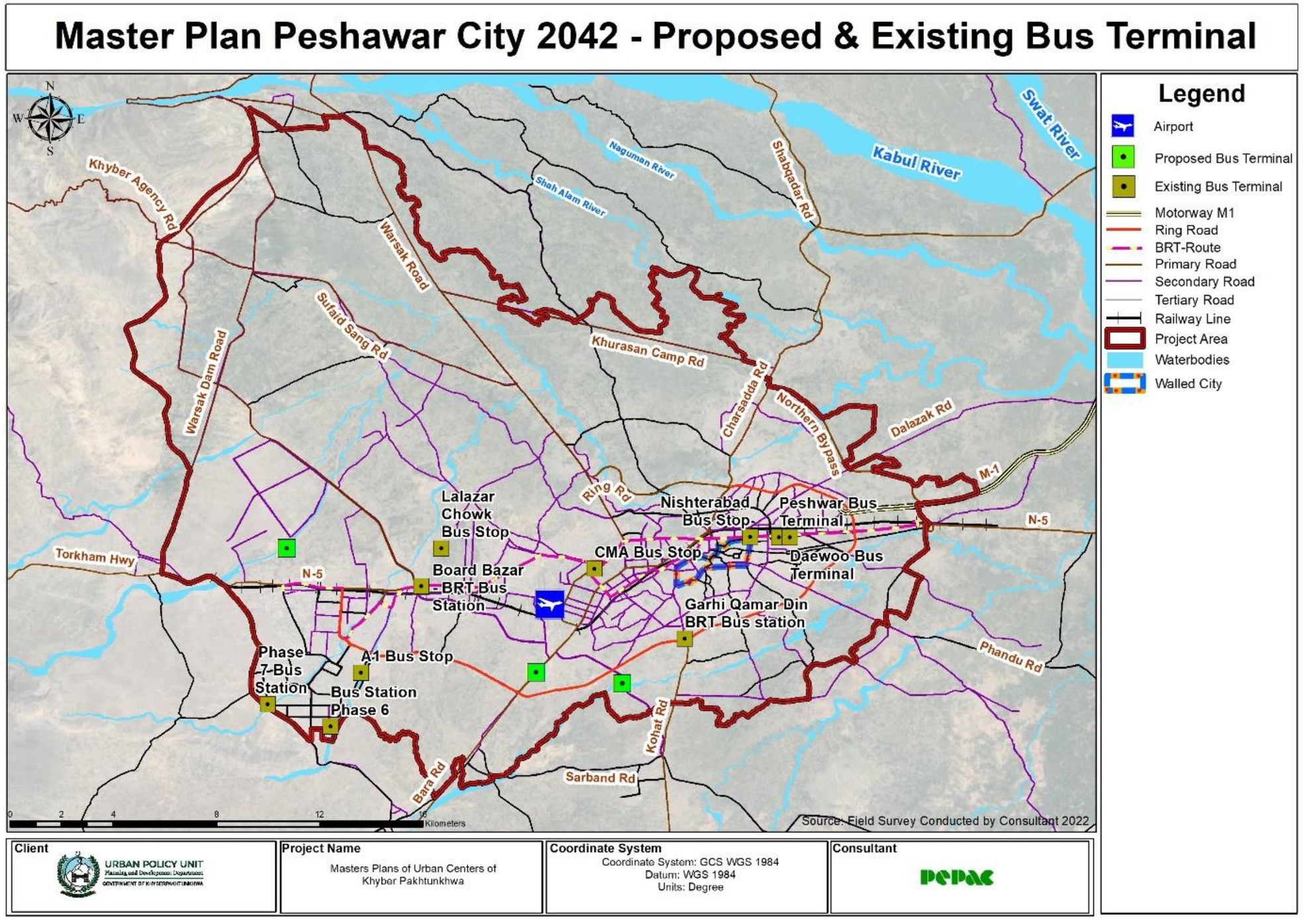
Feeder route extension from along Newly Proposed Primary Road (P1) towards Karkhano market to cater travel demands of residential zones R1 and R2.

More feeder buses shall be made operational to promote travelling on BRT and existing terminal facilities shall be improved such as maintenance, schedule and travel time.

The local public transport shall be properly regulated and improvements such as route optimization, maintenance, schedule, travel time, and travel cost shall be improved.

The existing mobility in Peshawar with respect to traffic flow and pedestrian movement is very critical.

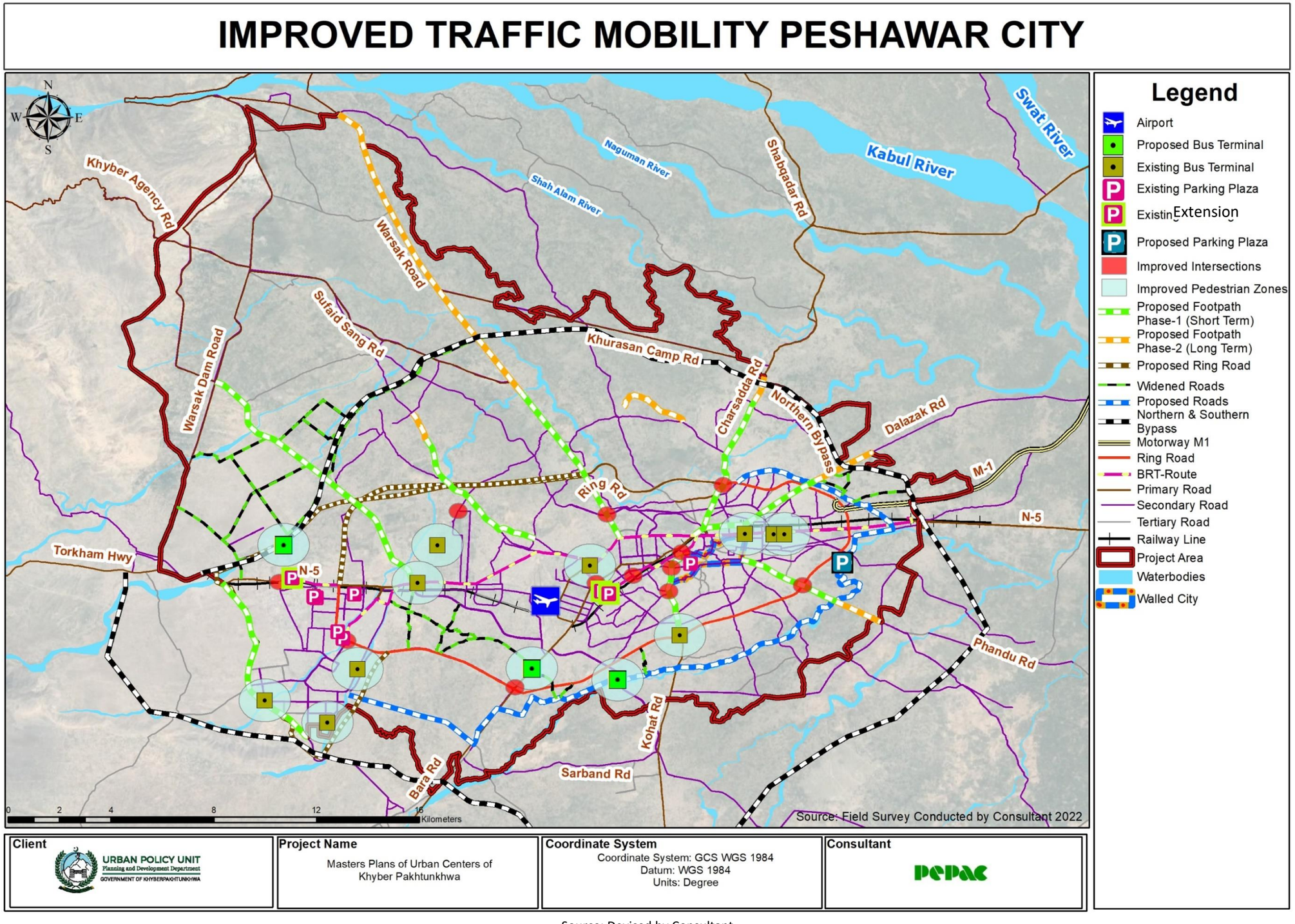
Map 32: Proposed and Existing Bus Terminals



Source: Devised by Consultant

As far as public transport mobility is concerned, the existing local public transport services shall be improved in terms of increased terminals, operating hours, and accessibility. The extension of BRT or its feeder routes and feeder buses shall be made considered to facilitate mobility in the newly proposed area. After these changes, the mobility in Peshawar city will drastically improve to cater the future demand. The future mobility situation is portrayed in the map below. The road widening improvements, newly proposed roads, proposed public transport terminals, and improved signalized junctions are shown in the map. By implementing the aforementioned interventions, mobility in Peshawar may improve.

Map 33: Improved Mobility conditions in Peshawar for 2042



Source: Devised by Consultant

14.5. Parking Proposals

Parking situation in Peshawar is a serious problem which needs to be dealt with in an efficient way. The existing parking facilities and its management is not enough to fulfil the demands of its daily commuters. Most of the vehicles were parked irregularly and illegally with no supervision which results in traffic congestion and traffic conflicts. Future parking demand is predicted using 5% growth rate to project vehicle parking demand. The results for future on-street and off-street parking demands are shown in tables below.

Table 46: Future Scenario of On-street Parking Survey

Road Segments Name	Cars/Jeeps/Pajeros/Pickup		Motocycles		Others	
	Frequency	%age	Frequency	%age	Frequency	%age
Charango Chowk - Sabzi Mandi	1894	48%	1197	30%	841	21%
Mahboob Medical - RMI (Outrage)	4824	48%	3181	32%	2080	21%
Chungi Chowk - Kohat Road	889	43%	663	32%	507	25%
Speen Jumat- KTH Emeregency Rd	1658	39%	1849	43%	772	18%
Ashraf Rd	1722	46%	1802	48%	260	7%
HMC Road	767	69%	263	24%	85	8%
Sui Corner- Kabali Chowk	1937	51%	1547	41%	313	8%
Malaqo-PIA Training Center	892	25%	2269	64%	377	11%
Malaqo-Edenrole	544	30%	1202	66%	80	4%
Abdra Rd	1818	68%	838	31%	19	1%
Toray-Dakkhana	1144	55%	921	44%	11	1%
Toray-Maqsood	761	54%	647	46%	12	1%
Irfan Hospital-Bashir Abad Rd	1263	51%	748	30%	448	18%
Sadaqat-Board Bazrar	1823	82%	364	16%	29	1%
BRT Station-HMC	1427	81%	255	14%	77	4%
Mission Hospital-Dabari Gate	3778	62%	1865	31%	443	7%
BRT Station-Shaheen Market	2141	85%	265	11%	117	5%
Cafe 99-MrCod	1106	50%	1032	46%	96	4%
BRT Stop-Hashtnagar	1207	23%	2881	54%	1236	23%
Assembly Hall-Jail Road	1048	89%	45	4%	80	7%

If necessary, actions are not implemented then future parking demands for on-street parking would drastically affect the moving traffic on roads of Peshawar. Therefore,

Dedicated parking lanes shall be provided along main roads.

Short-term parking on congested roads should be introduced for on-street parking and strict enforcement should be followed during peak hours.

Long-term on-street parking should be avoided, and vehicles should be directed to park off-street in dedicated parking lots or parking plazas.

The off-street parking demand is shown in table below:

Table 47: Future Scenario of Off-street Parking Survey

Road/Area Name	Plaza Name	Capacity (No. of Bays)	Vehicle Parked*
Abdara Road	MobiLink Plaza	45	42
	Sapphire Plaza	15	10
	J-K Plaza	15	33
	Sheikh Yaseen Plaza	85	81
	Noor Plaza	120	81
	Hameed Plaza	18	12
	Spinzar Plaza	15	44
	Haj Awal Khan	95	57
	J-B Tower	12	23
	Shahid Plaza	115	74
	Khattak Plaza	20	22
	Hamayun Plaza	20	27
	Azam Tower	35	45
	Malak Plaza	40	22
Karkhano City	Kabal Plaza	36	61
	Taj Market	100	129
	Malik Taj Market	30	42
	Awami Market	35	65
	Khyber Market	45	59
	Shanwari Market	80	94
	S.S Plaza	33	79
	Royal Plaza	100	88
	United Market	65	113
	Shaheen Market	100	94
	Pirano Market	200	161

Road/Area Name	Plaza Name	Capacity (No. of Bays)	Vehicle Parked*
	G.B. Plaza	70	421
	Ameen Market	50	89
Khyber Bazar- Dabghari Garden	Pak Medi Center Plaza	200	266
	Arshad Cinema Hall	20	15
	Khyber Medical Complex	25	53
	Mehmood Medical Complex	40	94
	Al-Ibrahim Hospital	20	35
	Sarjah Tower	10	18
	Abseem Hospital	30	61
	CMC Hospital	50	95
	Habib Plaza	15	30
	Al-Shifa Center	35	71
	Kainat Tower	30	59
	Sarhad Hotel	70	35
	Akum Hotel	10	18
	Syed's Parking	35	61
Saddar	Sasta Bazar Parking	80	134
	Shafi Market Parking	100	231
	Saddar Car Parking	300	360
	Time Center Parking	60	99
	Babar Market Bike Parking	65	104
	Malik Shakir Car Parking	200	364
	Royal Plaza	50	83
	United Car Parking	30	45
	United Bike Parking	100	87
	Apha Tower Car Parking	40	83
	Apha Tower Bike Parking	40	68
	Private Car Parking	60	74
	Private Bike Parking	50	42

* Vehicle Parked is an average value of full day vehicle parking

Source: Devised by Consultant

As evident from the table above, the future parking demand has drastically exceeded from the capacity of existing parking facilities as highlighted.

To meet the future demand, dedicated parking lots shall be provided along existing main commercial attractions.

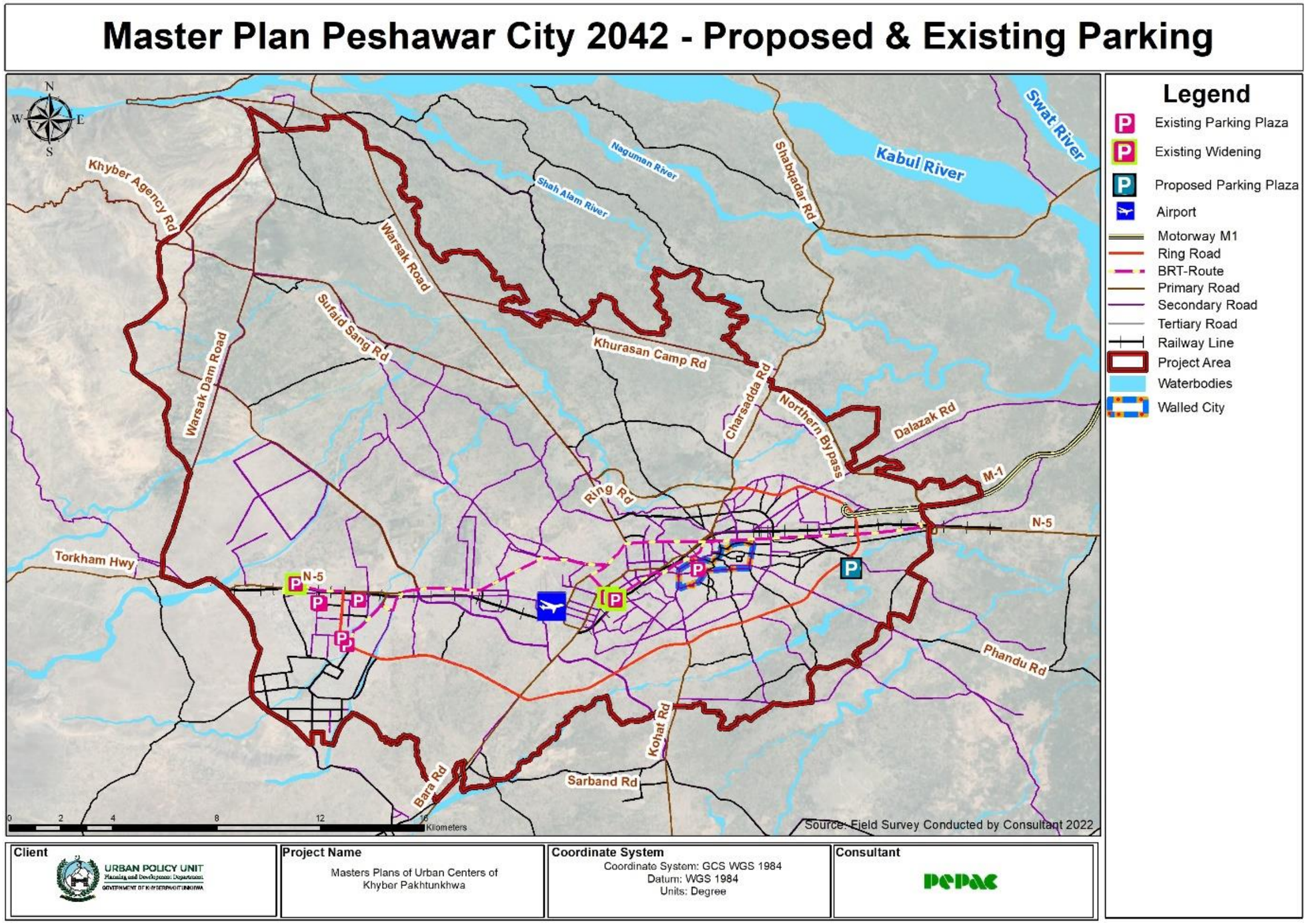
Future parking demands could be met by increasing the capacity of existing parking plazas by constructing a basement. The most critical parking plazas which should be considered are:

- Malik Shakir Car Parking in Saddar
- Shafi Market Parking in Saddar
- G.B. Plaza along in market

To avoid conflicts along proposed commercial areas, dedicated parking plaza shall be provided. The coordinates for proposed parking plaza is: 34° 0'18.80"N 71°37'11.26"E

14.5.1.Proposed and Existing Parking Plazas

Map 34: Proposed and Existing Parking Plazas



Source: Devised by Consultant

Chapter 15: Infrastructure Proposals

15.1. Methodology

The methodology adopted for the preparation of proposals for water supply and sanitation systems of the project area are discussed below:

I. Desk Study

After the award of project, based on TOR, all information regarding water supply system and sanitation in the project area or similar areas were collected. Based on the data, strategy for the household survey was prepared. Further, the data needs to be collected from the relevant departments and directly from ground, was also listed and documented.

II. Surveys

Once strategy of survey and list of data required has been prepared, teams were mobilized in the project area for household survey. These surveys include water supply and sanitation serviceability, type of water source, type of sanitation facility, quality of water, satisfaction with water supplies and sanitation facilities, water and sanitation charges etc.

III. Collection of Secondary Data

Teams were also mobilized to collect secondary data from relevant departments such as PHED, UPU etc. These data include location and discharge of layout maps of water supply, sewerage and drainage systems, tubewells, depth and quality of groundwater, outfall location of wastewater, identification of waterlogged areas (if any), size and location of water tanks and location and discharge of filtration plants, etc.

IV. Baseline Study Report

After the collection of household surveys, primary data and secondary data, all the data was compiled and scrutinized before any kind of analysis. Detail analysis was performed to access the existing water supply and sanitation situation. In the end, separate maps were prepared to depict existing water supply and sanitation situation.

V. Proposals

After the preparation of baseline study report, based on future population and future demand proposals for existing 2022 scenario and 2042 scenario has been prepared for water supply and sanitation. The proposals include water supply and sewerage and drainage layouts, proposals to meet water supply and sanitation flows, identification of new water sources, location of new facilities etc.

15.2. Existing Water Supply & Sanitation

The main authority responsible for the provision of water and sanitation services is Water and Sanitation Services Peshawar (WSSP) and it is also responsible for solid waste management in

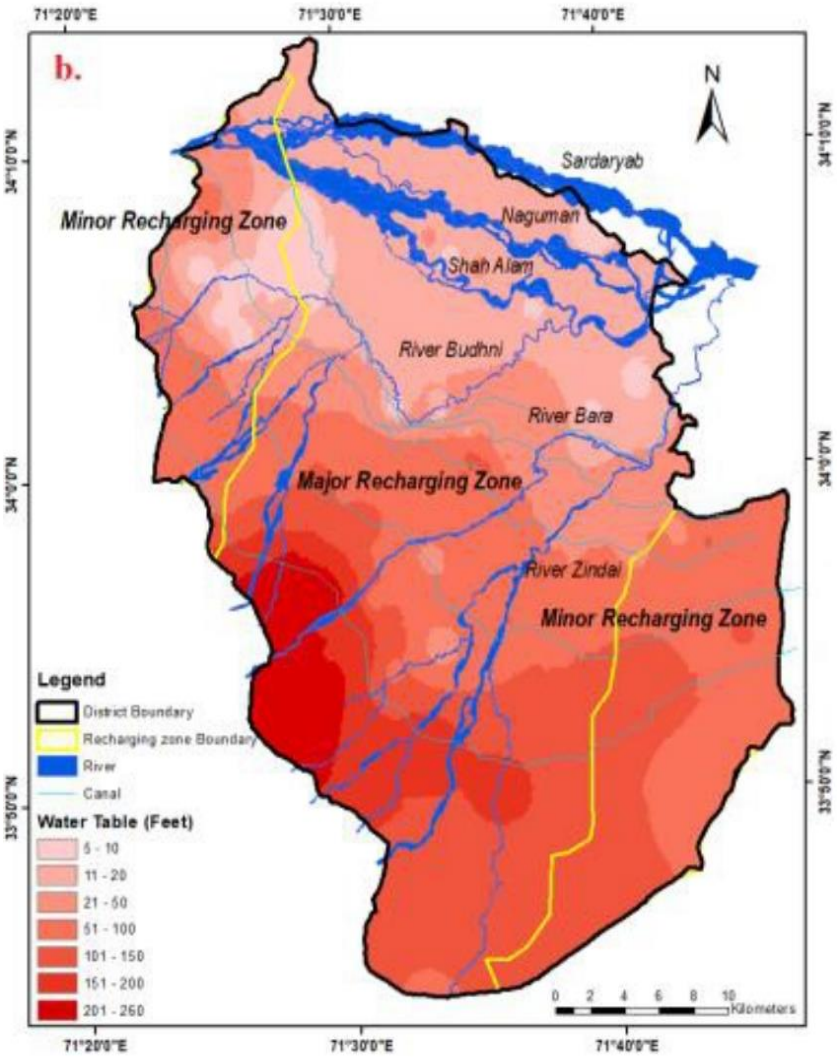
the urban areas, whereas it is the responsibility of the and District/Tehsil Council (DC) in the rural areas. Other areas are catered to by Peshawar Development Authority and Cantonment Board in their respective authority areas.

The data collected from the line departments has shown that there are 612 functional tube wells in Peshawar MC area which are operated 3 to 4 times in a day. Further, there are 43 functional filtration plants in the MC area. The water and sanitation situation of the city is abysmal, and this has been corroborated by the existing situation as there are four sewerage and wastewater treatment plants in the city, but none of these is functional and operative, and subsequently the untreated and unsafe sewer wastewater is directly dumped into Kabul River. Further, there is no established and functional storm/rainwater drainage system in the city. Being the most populous city of KP and having a consistent increase in population, the burden on physical infrastructure is increasing and consequently, the overburdened water and sanitation infrastructure will need to cater for current and future population demand.

15.2.1. Existing Groundwater Conditions

Groundwater studies are important to assess the groundwater resource, volume of water stored in geological formations, and the time it will remain stored with respect to recharge and discharge volumes. In Peshawar, the major source of water supply is groundwater. Peshawar being a metropolitan city of Khyber Pakhtunkhwa province and a major hub for economic trade has resulted in influx of population migrated from rural areas. Consequently, this rapid increase in population and unplanned commercial and industrial development has put additional strain on the groundwater resources. Therefore, increased pumping cost and electricity is also incurred due to lowering of water table. Moreover, untreated wastewater discharged into nullahs eventually outfall into Kabul River which affects the water quality of the shallow upper layer of the aquifer. Detailed groundwater investigations were conducted in 1968 in which two aquifers were identified in the Peshawar basin.

The upper aquifer has a depth of 61m and is unconfined while the bottom aquifer has a depth of 120 m and is semi-confined. Moreover, the upper aquifer is 10 times more permeable than the lower semi-confined aquifer. The hydraulic conductivity of the shallow aquifer varies from 1.64 to 4.75 m/day and for the semi-confined aquifer varies from 0.074 to 0.298 m/day. About 25-30% of water is infiltrated back into the water table from the irrigation land of Peshawar. Similarly, about 4% of rainwater gets infiltrated from annual precipitation of 817mm. Groundwater depletion is rapidly increasing because the extraction rate has exceeded more than the average recharge rate. For the past half century, groundwater shortage has been observed owing to the industrial, agricultural, and domestic use with a withdrawal rate or 750-800 km^3/year. If this trend continues in the future and extraction rate keeps on increasing without assessing the groundwater aquifer system, it may lead to depletion of groundwater and may result in severe water shortage. The water table depth of district Peshawar and recharging zones are shown in figure below.



From the figure, it can be observed that water table depth of Peshawar city is in the range of 50-100 ft. Moreover, the water abstracted from depth of 50ft is not suitable for drinking or domestic use.

Moreover, 30% of the aquifer is under high stress and in summer, due to high temperature, the demand of water increases further and poses stress on water table. The annual rainfall recharge is very small and the groundwater infiltration from distributary canals and irrigation is dependent on the influx from the Kabul and Bara Rivers which may fluctuate based on the consumption from the upper catchment areas. It is observed that about 95% of the population is dependent on tube wells for drinking and domestic water use. The estimated value of groundwater recharge from various studies is approximately 229 mm/ year while the groundwater depletion rate is approximately 57 mm/year. Similarly, the total abstraction rate of groundwater through government owned wells, private hand pumps, dug wells, and commercial wells comes out to be approximately 839,715 m^3/day.

15.3. Proposed Water Supply

In order to propose the water supply system, it is important to understand the existing water supply demand and its condition.

Current water demands of the study area of Peshawar is calculated based on current population as below:

Current Population of the study area of Peshawar = 3,388,596

Unit Demand of the study area = 55 gpcd

Current Avg. Water Supply Demand = 55 x 3,388,596

= 186,372,780 gallons per day

The current Avg. water supply demand @ 55 gpcd comes out to be 186 MGD.

The current peak water demand @ 2.25 peaking factor comes out to be 418 MGD.

15.3.1. Water Supply Gap Analysis

The current water demand for Peshawar study area is 418 MGD as computed earlier. The groundwater abstraction, in study area, is calculated by using the characteristics of tube wells. The overall condition of tube wells as well as electrical motor conditions is also considered in computing the discharge capacity of tubewells.

The MC tap water is supplied to only 68% of the population.

Population have access to MC tap water = 3,388,596 x 0.68

= 2,304,245

The average water demand for this population is considering unit water demand as 55 gpcd.

Average water demand of population getting MC tap water = 55 x 2,304,245

= 126,733,490 gpd

Maximum day demand = 1.5 x 126,733,490

= 190,100,235 gpd

= 190 MGD

The total abstraction in a day for the study area = 167,339,848 GPD

= 167 MGD

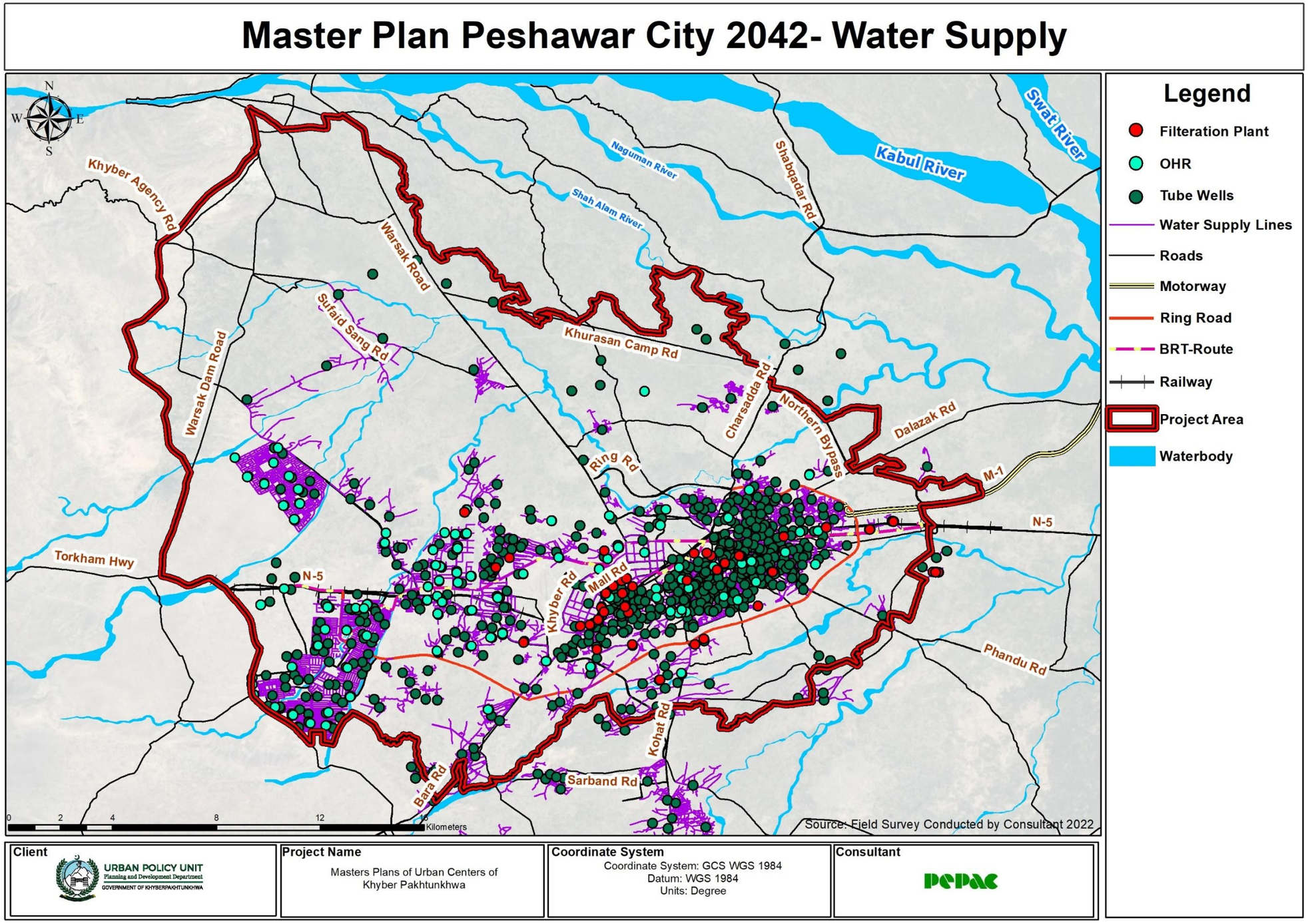
Therefore, the gap for water supply is computed as:

Gap = 190 MGD – 167 MGD

= 23 MGD

Hence, there is a gap of about 23 MGD between water supply and water demand. In order to meet future water demands, supply from Mohmand dam and Jabba Khattak Dam is proposed through a channel to relieve stress on groundwater source. Moreover, temporary tube wells have been proposed till the dams are fully operational to cater for future water demands. Future water demand has been calculated, and approximate volume of water required from dams has been quoted.

Map 35: Existing Water Supply Water Supply Plan 2022



Source: Devised by Consultant

15.4. Proposed Drainage & Sewerage System

In order to propose the sewerage and drainage system, it is important to understand current sanitation conditions, current sewerage flows need to be analysed thoroughly. Current sewerage flows of the study area of Peshawar is calculated based on current population as below:

Current Population of the study area of Peshawar = 3,388,596

Unit Sewerage Flows = 47 gpcd (@85% of Unit Water Demand)

Current Avg. Sewerage Flows = 47 x 3,3388,596

= 159,264,012 gallons per day

The current Avg. sewerage flows @ 47 gpcd comes out to be 159 MGD.

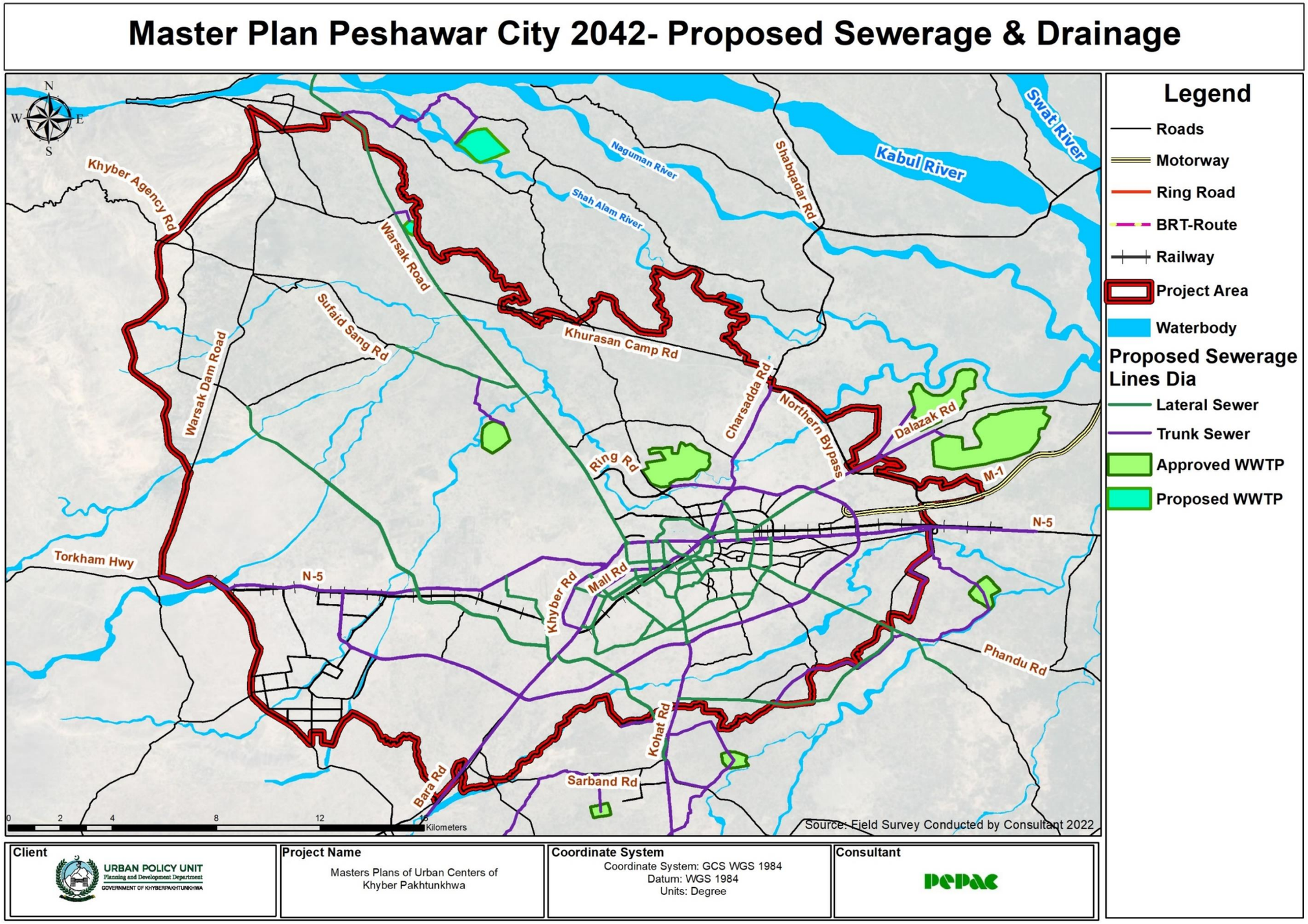
The current peak sewerage flow @ 3.0 peaking factor comes out to be 477 MGD.

In order to cater the aforementioned sewerage flow, the existing wastewater treatment plants (WWTPs) on Warsak Road, Charsadda Road, and Ring Road should be made operational. If this is not an option, then new treatment plants will be proposed by selecting a suitable site. Similarly, primary and secondary sewer pipes should be laid along main roads such as Grand Trunk Road (N-5), Kohat Road, Khyber Road, Warsak Road, Dalazak Road, Ring Road, Charsadda Road, Mall Road, and Palosi Road to carry wastewater towards WWTPs. Furthermore, an additional WWTP is also proposed for the areas between Warsak road and Warsak dam road. The existing drains along main roads should be used to carry storm water drainage which would eventually outfall into nullahs.

15.4.1.Proposal For Groundwater

Groundwater recharge is crucial to conserve groundwater and relieve additional stress for current and future abstraction through tube wells. Groundwater recharge could be done by proposing sufficient open spaces throughout study area. Rainwater harvesting techniques shall be utilized to maximize rainwater usage. Moreover, provision of recharge wells or recharge pits should also be considered within the urban Peshawar city to further aid groundwater recharge and maximize infiltration. Similarly, temporary wells proposed to aid future population till the operation of Jabba Khattak and Mohmand dam shall be converted to recharge wells to relive groundwater stress. Furthermore, illegal private bore wells should strictly be condemned to conserve groundwater.

Map 36: Sewerage network of Peshawar- Study Area



Source: Devised by Consultant

15.5. Solid Waste Management

15.5.1.Sustainable Strategic Measures

The proposed framework for Peshawar City's solid waste management will ensure that waste generated in the city is sustainably managed, reused, recovered, or disposed of in accordance with the provisions of the KP EPA Act, 2014, Pakistan Environmental Protection Act, 1997, and ADB SPS, 2009. Along with national-level policies, it will also undermine the SWM procedure of SDGs. Ensuring the highest levels of waste reduction, reuse, and recycling are met.

Adopting the circular economy approach as a strategic principle for sustainable and integrated waste management will necessitate actions across the entire value chain, from production and consumption to waste and resource management. Relatively, many good preventative measures do exist like community-based waste initiatives, and successful tourism sector initiatives.

Figure 26: Circular Economy Approach

- **Improved product design** that reduces the number of resources used in production
- **Shift in consumer habits** in which products are repaired rather than replaced waste are recycled and are reintroduction into the value chain.
- **Waste minimization**

15.5.2.Waste Minimization Process

Waste minimization is a method for producing less waste by following the 5 Rs. The primary goal of a sustainable SWM system is to recognize the Integrated Solid Waste Management Hierarchy and use available technologies to achieve a Key Performance Indicator: **'Maximize Solid Waste Diversion from Landfills**.' The Integrated and Sustainable Waste Management Hierarchy and 5R s are shown in the following below;

Figure 27: Sustainable Waste Management Hierarchy

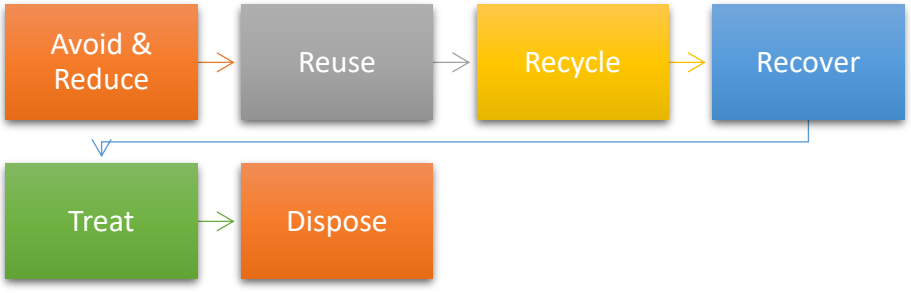
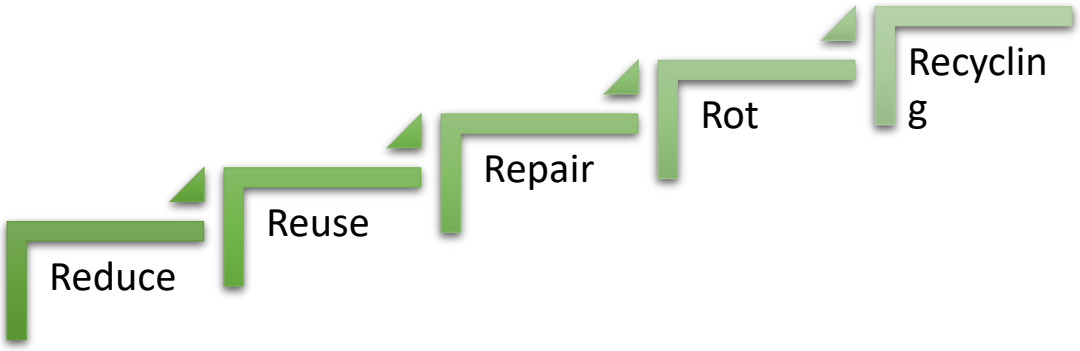


Figure 28 : Steps in 5RS



15.5.3. Optimization of Waste Generation and Reuse

Waste reduction at the source, also known as waste prevention, is the process of reducing the amount of waste produced. The most environmentally friendly strategy is to reduce waste at the source. Food waste, packaging material, and disposable products are common waste stream items that can be targeted for waste prevention and reduction. Aside from cost savings, it can also help to improve worker safety and liability.

Table 48: Suggestions and Strategies for Waste Reduction and Reuse

Suggestions and Strategies for Waste Reduction and Reuse		
Waste Reduction at Source and Reuse Strategies	**Food Waste**	• Food waste can be reduced by redistributing food that would be otherwise wasted to food banks.
	Packaging material	• Packaging material can be minimized by seeking products with minimal packaging and imposing penalties for plastic bags. • Biodegradable bags should be promoted.
	Disposable product	• Encouraging the purchase of durable, long-lasting goods. • **Tackling single-use disposables:** There is a need to address the problem of disposables that are often used for only a short period before being thrown away. Build public awareness on excessive consumption, its impact on the environment and future generations and the need for reduction.
	Promote Green-Labelled Products	• Purchase energy-efficient appliances for the promotion of sustainable consumption.

15.5.4. Improvement in Existing Practices

Citizens need awareness and education regarding proper sustainable waste management for the betterment of their own environment and neighbourhood. Following are some proposals for the improvement of existing practices which will benefit the whole SWM process.

Table 49: Proposed Improvement in Exiting Practices

Waste Generation Area	Proposed Improvements in existing practices
Residential Units	There is need to raise awareness among general public to encourage door to door collection of solid waste.
Commercial areas	Underground bins (within building specifically where car parking is provided) are proposed where containers cannot be placed to congestion and less space.
Construction Demolition Waste	There must be protocols for builders to pay for debris removals, by introducing standing committees to communicate with private construction companies to tackle the waste.
Animal Waste	Organized waste collection system should be developed as this waste can be used for composting
Institutional Waste	Appropriate containers to be placed within premises which will be emptied by WSSP through regular intervals
Hospital Waste	Infectious waste needs to be treated within hospital premises by introducing insulators for each hospital for efficient toxic waste management and it should not reach landfill site.

15.5.5.Waste Collection Strategies

Recycling		
Waste Collection Strategy	**Organic Waste**	Organic waste is generated from residential, commercial, hospitality and mixed-used. • **Organic waste** when collected and separated properly, it can be composted or processed in anaerobic digesters to create valuable products e.g. compost, and biogas, that can be used. • **Composting** is a sustainable method of managing organic waste and it is used as a natural fertilizer for the growth of plants. • Some restaurants have a regular flow of used cooking oil, grease and animal fat. These materials can be rendered into a variety of useful products, including animal feed, soap, lard, and cosmetics.
	Construction Waste	• Waste from maintenance and ongoing construction activities can also be a source of quality materials for recycling. • Care must be taken to ensure that hazardous materials, such as asbestos and PCBs are not mixed with recovered items.

	Wet/Dry Waste	• Wet materials that include yard trimmings, food scraps, paper and animal waste are separated from other materials for collection. Wet waste is usually composted. Other materials, including recyclables, from the dry portion. • Segregation of recyclables should be done during collection rather than at the processing stage.

15.5.6.Waste Collection Vehicles route planning

The route planning for the collection vehicles to circulate and effectively transport the waste to the dumping site. The following measures should be taken in consideration while route designing.

- Waste hauling routes should not overlap.
- The largest waste-producing sources should be given higher priority during waste collection than the smaller sources.
- To keep the driver and vehicle workloads the same, collection and transport time should be equal on each route.
- All vehicles and equipment should all have regular cleaning and maintenance schedules to prevent the build-up of doors or infestation from rodents or insects.
- Total costs for a fleet are weighed sum of drive time, the number of vehicles needed, wait time and task performed.

15.5.7.Disposal and treatment of waste

Once collected, municipal solid waste may be treated to reduce the total volume and weight of material that requires final disposal. Treatment changes the form of the waste and makes it easier to handle. It can also serve to recover certain materials, as well as heat energy, for recycling or reuse Treatment and disposal of waste can help to reduce the volume and toxicity of waste through physical (e.g., shredding), chemical (e.g., incineration), or biological processes.

Waste Treatment and Disposal Methods		
Waste Disposal Methods	**Recycling**	• Recycling is one of the best methods of disposal simply because it goes a long way to preserving the environment. • When waste is reduced or reused at the source, less waste needs to be collected, transported, and disposed of. • This reduction in extractive processes leads to both environmental benefits and cost savings throughout the life of a product. • It is recommended that CBD Management should sign a contract with modern recycling & compositing facility to ensure environmental sustainability.

	Incineration	• This type of waste disposal involves the dumping off method where you eliminate waste materials via combustion. • Burning is a very effective method of reducing the volume and weight of solid waste. Incineration can reduce the volume of uncompacted waste by more than 90 percent. • Incinerators convert waste materials into heat, gas, steam, and ash. • It is recommended that CBD Management should sign a contract with EPA approved facility to dispose of hazardous solid waste.
	Landfill	• Methane gas, a byproduct of decomposing waste, can be collected and used as fuel to generate energy. • Waste that cannot be prevented or recycled should be disposed of in properly designed, constructed, and managed landfills. • Final disposal of waste is at LWMC's landfills where the non-recyclable municipal solid waste will be disposed. It is recommended that Higher Management should sign an agreement with Waste Management Company for Landfilling.

15.5.8.Additional Proposals for Landfill Sites

1. Technological Alternatives

Different types of technological alternatives can be use for better management of landfill sites for Anaerobic Digestion System, Material Recovery Facility, Waste Disposal Alternatives with a composition of possible treatment options along with Economical Aspect Analysis of different types of landfilling technologies.

2. Mitigation Measures for Landfill Site

Mitigation measures for the pre-construction, design, operation, closure, and post-closure phases are important and should include leachate collection and treatment, landfill gas management, odour control, and vector control.

Construction-related mitigations is also necessary for prevention of soil and ground/surface water contamination, OHS issues, social conflicts, vegetation loss, and communicable diseases. Mitigations is also required for leachate and landfill gas management.

15.5.9.Safety Precautions for Sanitary Workers

For the collection, storage, and disposal of the solid waste generated by the plan to be effective and quick, the health and safety of all workers involved in the task is mandatory. Basic personal hygiene is also important for reducing the risk of handling waste, and convenient washing should be advised for personnel involved in the task. Essential occupational health and safety measures are appended below:

Figure 29: Safety Precautions for Sanitary Workers

Proper training of workers for the handling of solid waste.
Provision of required personal protection gears.
Establishment of an effective occupational health program that includes immunization and medical surveillance.
Additionally, following protective gears should be made available to all workers dealing with this task:
Face masks
Overalls (coveralls) / plastic aprons
Long sleeved shirt

15.5.10. Different Waste Materials Management

There is a need to develop an action plan for the effective disposal of e-waste in Pakistan through handling and dismantling procedures at the various levels:

- Public Awareness Raising
- E-Waste categorization at the municipal level
- Safe disposal of E-waste by original equipment manufacturers which understand best how parts can be reused.

15.5.11. Disposal of Health Facilities Waste

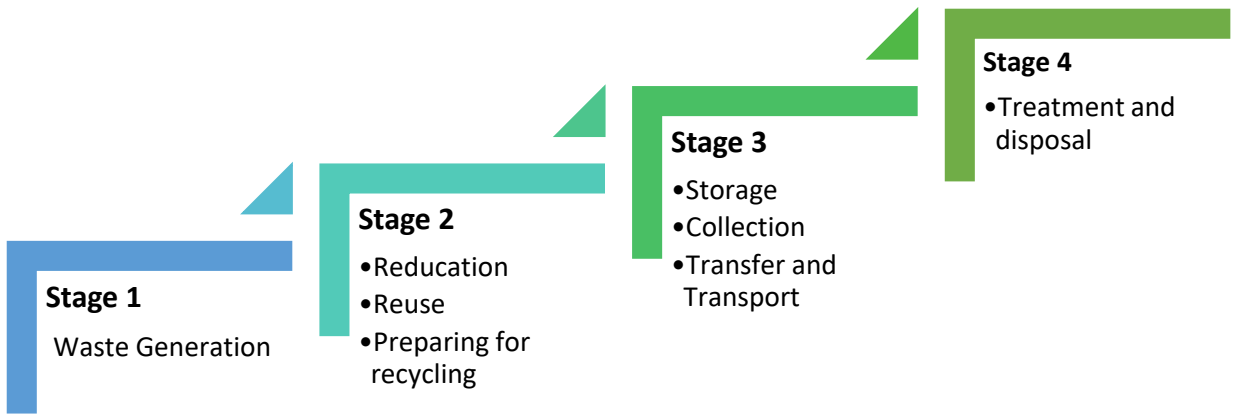
Sustainable management of hospital or any health care unit has more to do with segregation at source, to separate the infectious 15% from the municipal waste that is generated. Key measures that must be adopted include:

- Reallocate available assets for the management of infectious medical waste.
- Avoid recycling activities to prevent human contact with potentially infectious domestic and medical waste.
- The waste shall be collected in accordance with the schedule specified in the waste management plan.
- Hospital waste in Pakistan is regulated by the Hospital Waste Management Rules, 2005 (HWMR), issued by the Ministry of Environment in August 2005 (Ministry of Environment, Pakistan, 2005).

15.5.12. Waste Collection by inducing 3Rs

After waste is collected the '3 Rs' should be practiced by separating the waste at source. Stage three consist of storage, collection, transfer and transport. The fourth stage/final stage is Waste treatment and disposal.

Figure 30: Waste Collection



Transfer Station

In order to improve the overall waste management system and urban environment, waste transfer stations are needed. The other prime objective of this intervention is to restrict the commuting of smaller vehicles to the landfill site, thus reducing negative environmental impact. Depending upon the site, location, and collection vehicles, the following three types of transfer stations are proposed:

- Mini Transfer Station
- Mobile Transfer Station
- Main Transfer Station

They will serve for transferring the waste from small capacity to large capacity vehicles to haul waste. Waste segregation will be carried out at Material Recovery Facility, located within the landfill site.

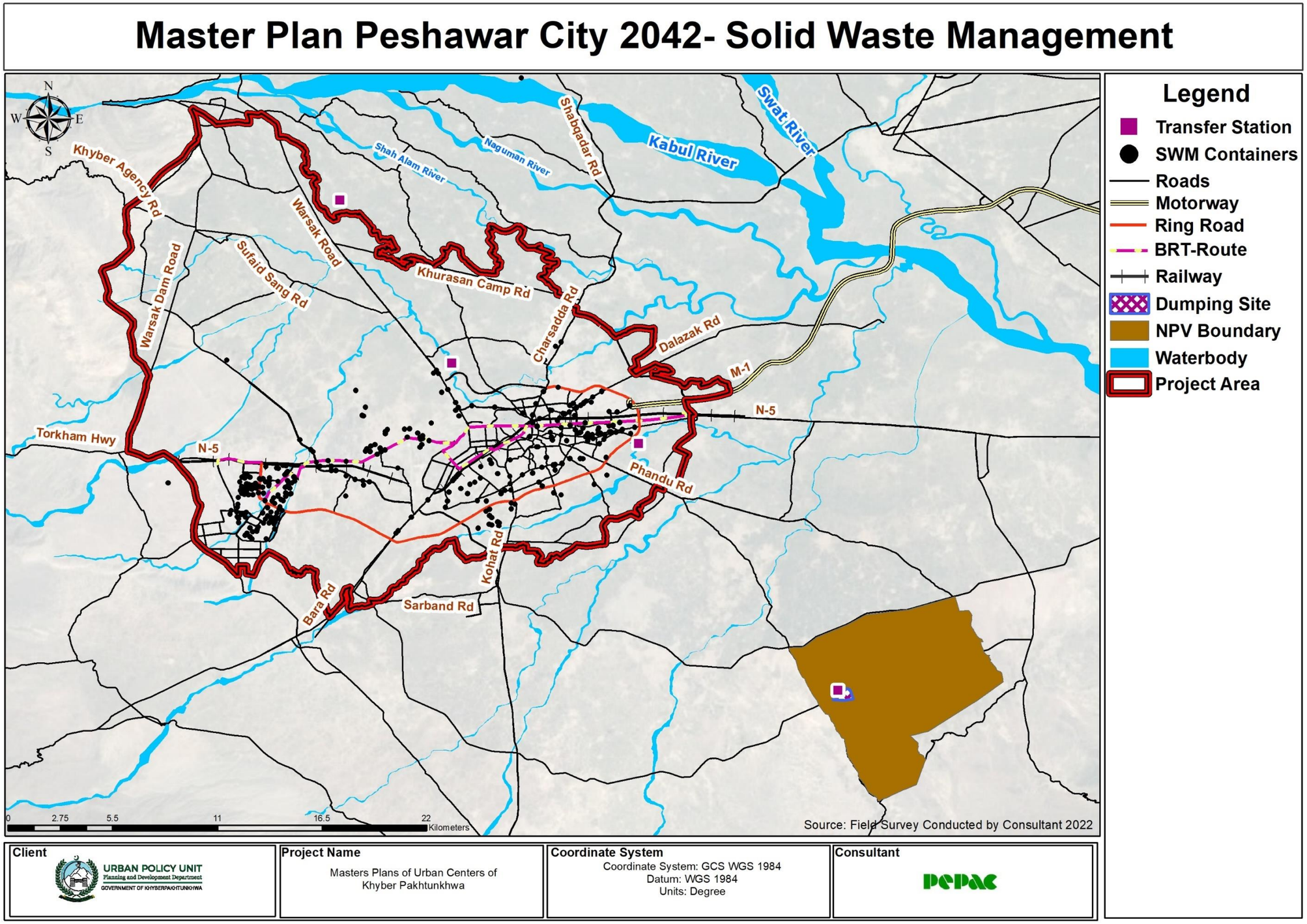
15.5.13. Mitigation Strategies

Following is the mitigation strategies can be adopted to cater with the solid waste management issue in the projected area.

Mitigation Measures for Solid Waste Management		
Possible Impacts	**Mitigation Measures**	**Responsible Authority**
Soil Pollution **Water Pollution** **Natural Aesthetics Degradation** **Health Impacts**	• Prohibition on open dumping, littering and solid waste burning. • Establishing and ensuring the implementation of solid waste management mechanisms (collection, transportation, and disposal). • Separate labelled and color-coded bins at appropriate designations. • Solid waste must only be disposed of in designated areas. • Collaboration between government agencies, local communities, and private businesses to ensure solid waste management. • Wherever possible, encourage traditional nature-based composting of organic waste.	**Responsibility:** • Waste Management Department • District Administration • All tourist facilities • NGOs working on Solid Waste Management. **Monitoring and Enforcement:** • District Administration • GB-EPA • Local Bodies

Mitigation Measures for Solid Waste Management		
Possible Impacts	**Mitigation Measures**	**Responsible Authority**
	• Appropriate, and cost-effective facilities for waste collection, segregation, and disposal • The use of plastic bags and other non-biodegradable and toxic waste must be strictly prohibited. • Provision of waste-handling equipment in a safe manner. • Providing awareness measures and trainings to locals as well as relevant staff. • All waste sources must ensure waste management planning based on their carrying capacity.	

Map 37: Proposed Landfill Site - Peshawar



Source: Devised by Consultant

Chapter 16: Environment

16.1. Identification of Environmentally Sensitive Areas

Sensitive receptors include, but are not limited to, hospitals, schools, day-care facilities, elderly housing, and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants. Extra care must be taken when dealing with contaminants and pollutants in close proximity to areas recognized as sensitive receptors.

The typical descriptors and criteria for the sensitivity of a receptor are listed below.

Table 50: Typical Descriptors and Criteria for Environmental Sensitivity Areas

Typical Descriptors and Criteria for Environmental Sensitivity Areas	
Sensitivity	**Typical Criteria Description**
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale

16.2. Plans & Proposals

The plans and proposals are explained below on the basis of priority, short term, medium term, and long-term basis.

16.2.1. Agricultural Land Conservation and Development

The growing need for space for residential, commercial, and other non-agricultural uses has threatened the city's agricultural lands. Anecdotally, there have been reports of agricultural lands to have been converted to non-agricultural uses, done either through legal prescription or illegal conversions (i.e., not cleared with government agencies concerned). However, determining the rate of conversion of the city's agricultural lands to non-agricultural uses, to cover a period of time, requires more detailed assessment and review of existing protocols on land classification and land use assessment involving land management agencies, such as the PDA, Directorate General of Farm Management, Research & Development Directorate, Peshawar.

The development of Agricultural Areas is based on the following:

- Intensify crops, livestock and poultry, and fishery production.
- Establish strategically located plant nurseries to supply location-specific crop varieties.

- Upgrade and intensify seedling production at the existing city plant nursery.
- Promote vegetable production through clustering.
- Provide post-harvest facilities and common service facilities (CSFs).
- Rehabilitate and upgrade existing irrigation system.
- Promote value-adding technologies to selected agricultural commodities where applicable.
- Provide alternative Agri-based livelihood projects.
- Improve the entrepreneurial skills of farmers.
- Use of modern techniques for cultivation with quality seeds, pesticides and fertilizers.
- Measures to reduce water logging and salinity and installation of tube wells.
- Rehabilitation / Re-Sectioning / Realigning of canals and drains.

The following adaptation measures have been proposed to make environment sustainable, green, environment friendly and liveable.

Table 51: Agricultural Land Conservation and Development Proposal

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
1.	Development of Risk Management System to provide protection against crop failures caused by extreme climate events such as floods and droughts	Establish a surveillance system for agricultural production at all susceptible locations to categorize them based on their vulnerability to extreme climatic events.	Priority	Agriculture Department including Research Institutions
		Involve farmers in the process of identifying local risks and devising safeguards.	Priority	Agriculture Department including Research Institutions
		Research should be carried out in collaboration with universities and research institutions for commercialization of drought and heat resistant crops.	Short-term	Agriculture universities, Agriculture Research Institutions, Agriculture Department
2.	Prevention and Imposing of Ban on conversion of Agricultural land to	stringent legislation to discourage conversion of agricultural land for urban development.	Short Term	LG&RDD, Agriculture Department, FE&WD

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
	Non- Agricultural Land.	Conduct awareness campaigns for farmers and other stakeholders about the safe and efficient use of agricultural land.	Priority	
3.	Encouraging farmers to avoid monoculture and cultivate a diverse range of heat and drought-resistant crops to prevent crop failure particularly in rain-fed areas.	Identify susceptible locations within rain-fed agriculture systems that are prone to increased crop failure due to heat and drought.	Priority	Agriculture Department and Universities
		Transform the local market to accommodate changes in cropping patterns in rain-fed areas.	Short-term	Same as above
4.	Encourage farmers to adopt agricultural drought management strategies.	Cultivate and introduce drought-tolerant crops.	Short-term	Agriculture Department, Agriculture Research Institutions
		Involve the farming community in managing recurring droughts caused by climatic variations.	Medium term	Agriculture Department, RR&SD
		Provide incentives for the reuse of domestic and sewage water for kitchen gardening.	Short-term	Agriculture Department, FE&WD
		Identify the agricultural areas that are prone to drought.	Priority	Agriculture Department, RR&SD, FE&WD
5.	Ensure an enabling financial environment for farmers to invest in and implement	Improve existing financial services for farmers in order to accommodate the technical innovation.	Medium term	Agriculture Department and Universities

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
	green technology to address ongoing climate issues.	Develop institutions that educate farmers about available funds for technology, equipment and new crops.	Short-term	Agriculture Department, FE&WD
		Reduce or no taxes on all agricultural activity and tree plantation.	Short-term	Agriculture Department, Finance Department
6.	Improving crop yield by improving irrigation water input.	Investigate novel cropping patterns to improve agricultural yield under water-stressed conditions	Short-term	Agriculture Department
		Encourage community participation in the sustainable management of irrigation water and the rehabilitation of field water courses.	Short-term	Irrigation Department, Agriculture Department, CSOs
		Discourage the use of traditional flood irrigation practices.	Medium term	Same as above
7.	Conservation of water and energy through efficient farming techniques and field mechanization.	Encourage the use of low delta crop varieties.	Priority	Irrigation Department, Agriculture Department
		Ensure the systematic mechanization of agricultural production processes based on energy-efficient equipment.	Medium term	Agriculture Department, Finance Department
		Invest in tools and equipment that boost	Medium term	Same as above

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
		yields while saving labour force.		
		Adopting regenerative agriculture.	Priority	Agriculture Department
		Encourage use of raised bed agriculture.	Priority	Same as above
8.	Adopting modern farming techniques to improve farm practices.	Introduce the intercropping system (also known as ally cropping) and soil conservation practices.	Short-term	Agriculture Department.
9.	Promoting organic and urban farming.	Promote kitchen gardening, Environmentally Friendly agriculture, roof-top farming and vertical farming.	Priority	LG&RDD, Agriculture Department
10.	Promoting biotechnology in terms of more carbon-responsive crops through genetic engineering and other relevant domains.	Develop the capacity of relevant institutions for the introduction of carbon-responsive plants and crops	Short-term	P&DD, FE&WD, Agriculture Department.
		Improve infrastructure to absorb biotechnology and genetic engineering for crops in order to improve varieties and make them drought resistant.	Medium term	Agriculture Department, Universities.
		Strengthen and promote agriculture-based research activities by developing academia – Industrial linkages.	Priority	Agriculture Department, FE&WD Universities
11.	Promoting horizontal extension of cultivated fields through wasteland	Extensive research via linkages with academia is required in order to locate cultivable	Short-term	Agriculture Department, Irrigation, FE&WD

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
	development and rainwater harvesting with the participation of local communities.	wastelands in the Peshawar city.		
		Educate local communities on how to harvest rainwater in small ponds, storage tanks, sunken fields and reservoirs	Priority	P&DD, LG&RDD, Irrigation, Agriculture Department
		Enact legislation to discourage the conversion of agricultural areas to non-agricultural uses.	Priority	LG&RDD, Agriculture Department, FE&WD
		Raise funds for the development of irrigation and rainwater dam infrastructure	Medium term	Finance Department, P&DD, Irrigation Department
12.	Developing a smart agriculture plan and models for sustainable agricultural production across all agro-ecological zones.	Agricultural plan for city needs to be developed.	Priority	Agriculture Department FE&WD
		Enhance institutional capacity to create digital simulation models to assess the agricultural productivity and its comparison with past and future.	Short-term	Same as above
		Conduct an assessment of the effects of Climate Change on the physical, chemical, nutritional and biological elements of agricultural production systems across all agro-ecological zones	Priority	Same as above
		Conduct a detailed evaluation of the existing agricultural	Priority	Same as above

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
		product system and provide recommendations for increasing productivity.		
13.	Developing high-quality datasets on crop, soil, and climate-related characteristics to aid in Climate Change impact assessment and productivity projection studies.	Strengthen the capacity of the Bureau of Statistics and allied departments to collect data on crop, soil and climate-related characteristics for various aspects of agricultural production systems in all agro-ecological zones.	Short-term	Finance Department, P&DD, Agriculture Department, FE&WD
		Improve research facilities at selected agricultural research institutions for assessing the impact of Climate Change and projecting agricultural productivity.	Short-term	Agriculture Department, Agriculture Research Institutions, Universities
14.	Reducing greenhouse gas emissions in the agriculture sector through better management and green techniques.	Establish Integrated Pest Management (IPM) that initially utilizes the indigenous solutions to prevent the pest attacks.	Short-term	Agriculture Department
		Develop and communicate best management methods for methane and nitrogen management in agriculture.	Priority	
		Organize pest management training sessions for farmers.	Short-term	

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
		Develop optimum tillage and soil management practices that increase soil carbon storage.	Short-term	
		Introduce the crop varieties that are low water dependent.	Priority	
		Encourage the use of green manure in agriculture.	Priority	
		Identify and encourage improved manure storage and management practices.	Priority	
		Increase energy efficiency in agriculture sector to reduce carbon emissions.	Short-term	
15.	Tax relaxation for agricultural sector.	Reduce taxes for any kind of agricultural activities and plantation of trees	Priority	Finance Department, FE&WD, Agriculture Department

16.2.1.1. Urban Forestation and Tree Plantation

Urban trees in parks, yards, streets, and remnant parcels have been features of urban design and landscape architecture for centuries (Arnold, 1980), and are still integral components of civic spaces that are well-recognized for their public value. Urban trees are claimed to have a number of environmental benefits, such as pollution absorption (Nowak et al., 2006, 2018), stormwater mitigation (Bartens et al., 2009), atmospheric cooling (Shashua-Bar and Hoffman, 2000), reduced energy use (Hsieh et al., 2018), mitigation of urban heat effects and habitat provision (Burghardt et al., 2009). In addition, literature and research studies have indicated urban forestation and trees not only increase the value of property (Escobedo et al., 2015), it also helps to facilitate improvement after stress and illness (Li and Sullivan, 2016), and reduce mental fatigue (Houlden et al., 2018). There is a extensive research available which indicates that trees provide benefits for municipalities and their residents, and this perception, in part, has motivated local, regional and global initiatives that promote the planting of urban trees (McDonald et al., 2016).

However, due to increasing earth temperature and increasing effects of climate change, people are now of empirical understanding that tree plantation is a nature-based solution to all climatic events and reduction of pollution. Awareness campaigns about urban forest planting by keeping in mind the species composition and need, soil dynamics, is need of the hour Oldfield et al., 2013). Some of the long lasting benefits of urban forests require that trees are planted on large spatial scales beyond municipal boundaries, and maintained over the long term, to ensure effectiveness (Salmond et al., 2016). However, trees may provide many other ecosystem services even when planting is constrained by the relatively limited spaces in dense cities. (Laukkonen et al., 2009).

Urban forestry and ecological corridors are essential for cities like Peshawar to provide environmental, social, and economic benefits such as cleaner air, improved water quality, and wildlife habitat. Ecological corridors help connect fragmented habitats, contribute to biodiversity, and enhance urban ecosystems. However, sustainable planning and management considering local conditions is crucial. Urban trees and forests can be managed to impact urban water, heat, carbon, and pollution cycles to build sustainable and inclusive communities. Tree plantations provide recreational spaces, improve air quality, and increase property values for residents. The primary goals for tree plantation in Peshawar include biodiversity conservation, climate change mitigation, soil and water management, livelihoods of communities, ecological connectivity, and community engagement. To achieve these goals, proposed actions include afforestation campaigns, ecological corridor development, community-based tree plantation, agroforestry, private land reforestation, and monitoring, planning, and implementation at the city level.

The networks of linear corridor which are connecting pathway among green belts, green spaces and linear plantation along canal approx. ~ 22 km and tracks are designed to improve the environmental qualities of the city. Green corridors are especially beneficial for regional biodiversity as they create cool air pathways that cool cities and improve air quality. Additionally, green corridors help to improve the aesthetic view of highways and offer locals recreational opportunities. In order to improve the environmental values of division, the networks of linear green corridors are need of districts to frequently developed along green belts and increase the green infrastructure.

Urban Forestry and Ecological Corridors have several positive impacts on air, water, soil, and noise pollution in cities like Peshawar:

1. Air Pollution Mitigation: Urban forests will be developed to help to mitigate the urban heat island effect by providing shade and reducing the need for air conditioning, which further reduces energy consumption and associated air pollution.
2. Water Pollution Reduction: Tree roots also act as natural filters, absorbing excess nutrients and contaminants from stormwater runoff, thereby reducing the pollution load entering streams, rivers, and groundwater.
3. Soil Conservation and Enhancement: Urban trees and forests help to protect and enhance soil quality. Tree roots stabilize the soil, preventing erosion and reducing the

risk of landslides. The leaf litter and organic matter produced by trees improve soil fertility, structure, and water-holding capacity. This enhances the overall health of urban soils and promotes the growth of other vegetation.

4. Noise Pollution Reduction: Trees absorb and diffract sound waves, providing a buffer between noise sources such as traffic, construction, and industrial activities, and residential or recreational areas. This can contribute to a quieter and more peaceful urban environment, improving the quality of life for residents.

Overall, urban forestry and ecological corridors contribute significantly to creating healthier and more sustainable cities by mitigating air and water pollution, conserving soil quality, and reducing noise pollution. These positive impacts enhance the overall well-being of communities, promote biodiversity, and create more livable urban environments. The map below is showing proposed urban forestation Peshawar;

Table 52: Urban Forestation and Tree Plantation Proposal and Plan

Sr. No	Proposal	Sub - Action	Priority	Responsible Authority
1.	Addressing the essential knowledge gaps about the depleting natural environment through forest adaptation research.	Conduct 'forest ecosystem' based research and identify ecosystems with high and low resilience with respect to changing climatic conditions.	Short-term	P&DD, FE&WD
		Promote research studies on the responses of different forest types to rising temperatures and drought spells.	Short-term	
		Conduct forest pathology and entomology studies in sensitive forest types/areas to control insect and disease outbreaks.	Short-term	FE&WD
		Undertake and maintain an inventory of all street and park trees.		
		Conduct research on forest management systems to explore new tools and adaption strategies for managing forest areas.	Medium-term	
		High-resolution satellite, air, and drone imageries of the City and surrounding areas taken every five years will inventory and monitor trees, parks, and natural areas.		
		Develop an effective 'Risk Management	Medium-term	

		Framework' for forest management including research findings.		
2.	Taking suitable actions to adapt to the anticipated adverse impacts of Climate Change and strengthen the ecological resilience of forest ecosystems.	Implement forest protection measures by considering occupational health and safety to minimize the damage caused by forest fires.	Priority	FE&WD, RR&SD
		Encourage the use of native and locally adapted flora.	Priority	FE&WD
		Identify suitable forest management strategies based on scientific studies to address the probable implications caused by Climate Change.	Medium term	FE&WD
		Promote the use of GIS/RS techniques in mapping of climate vulnerable forests, as well as in monitoring and implementing ecosystem-based adaptation.	Priority	FE&WD, P&DD
3.	Promoting best practices of Sustainable Forest Management (SFM) through the development of appropriate Criteria and Indicators (C&I) to secure the social and environmental values and services provided by forests	Develop and implement criteria and indicators that clearly define SFM; provide manuals and guidelines to track progress towards it.	Short – Term	FE&WD
		Formulate and implement appropriate forest legislation, regulation, and incentives to encourage sustainable forest management.	Medium-Term	

		Promote the exchange of best practices and experiences, particularly among forest communities and civil society organizations, through networking, workshops, seminars and exposure visits.	Priority	FE&WD, CSOs
		Launch specific projects and programs to promote the sustainable use of non-timber forest produce (NTFP) with community engagement, with a special focus on livelihood improvement.	Priority	FE&WD
		Incorporate land use planning and community participation in forest land management.	Priority	
		Strengthening and reorganizing Forest Department to establish manageable forest management units.	Medium-Term	
		Take proper measures to prevent forest encroachment.	Priority	
		Emphasize on **'self-sustenance'** in the use of forest resources for local communities.	Short – Term	
4.	Raising awareness among the general public, and forest communities and enhancing capacities of forest experts about	Develop joint programs in collaboration with civil society to highlight the role of forests in combating Climate Change, particularly among forest-dependent	Priority	FE&WD

	forestry and Climate Change adaptation.	communities and students.		
		Promoting faith-based awareness campaigns.	Priority	FE&WD, CSOs
		Establish **'Communication'** wings in the relevant departments.	Short-term	FE&WD
		Conduct public opinion polls on a regular basis to assess public understanding of forestry's role in combating Climate Change.	Short-term	FE&WD, Information Department
		Create and promote 'Forest and Climate' expert groups to disseminate new ideas and information to the public, forest communities and professional foresters.	Short-term	FE&WD, Information Department
		Promote the role of forestry in solving environmental issues by participation in appropriate government, sectorial and cross-sectorial forums.	Priority	FE&WD, P&DD
5.	Enhancing the capacity of Forest Department and other stakeholders for the effective development and implementation of innovative mechanisms aimed at preventing deforestation and	Set up institutional and legislative frameworks to clearly define the rights to carbon stored in forests.	Short-term	FE&WD
		Develop a strategy for establishing a regulatory, governance and legal framework for REDD++ mechanisms in consultation with all	Short-term	FE&WD

	increasing forest carbon stocks.	stakeholders, including communities that rely on forests for their livelihood.		
		Arrange training for expert foresters and officials from FEWD on preparing paperwork for CDM and REDD+ projects.	Priority	FE&WD
6.	Developing and implementing strategies to prevent deforestation, reduce carbon emissions and improve forests' ability to sequester more emissions from the atmosphere	Pursue major afforestation and reforestation efforts to increase forest cover in the Peshawar city and establish Urban forest areas as effective carbon sinks.	Priority	FE&WD
		Encourage low delta plants along canal and streams.	Priority	FE&WD and irrigation department
		Strongly promote farm forestry and agro-forestry practices through the plantation of multipurpose and fast-growing tree species to meet the local population's demand for fuel, timber and livestock feed.	Priority	FE&WD, Agriculture Department
		Develop effective strategies to prevent illegal forest cutting and effectively implement such measures in all forest types throughout the city.	Medium term	FE&WD
		Launch projects and programs to provide alternative fuel and livelihood options for	Priority	Same as above

		forest-dependent communities in order to compensate avoiding deforestation.		
7.	Creating effective mechanisms to track the progress from the start and throughout the implementation of the recommended actions	Urban forest and green area studies should be carried out every 10 years, including the urban forest canopy assessment and recommendations for urban forest improvements.	Short-term	Same as above

16.2.1.2. Fisheries

The fishing industry provides significant economic support to many people worldwide, including in Peshawar where there are opportunities for productive fishing along its rivers. To maximize the potential of the fish industry, local and provincial governments need to develop the right strategy. The study's objectives focus on creating a strong local fish output to make the city self-sufficient and aid in economic growth for other towns.[20]. The major goals for the protection and conservation of fisheries in Pesahawar are sustainable fish stock management, biodiversity conservation, economic benefits, environmental protection, and compliance with fisheries regulations. Proposed actions to meet these goals at the city level include developing a fisheries management plan, encouraging appropriate fishing practices, investing in research and monitoring, promoting education and outreach, adopting new and green technologies, establishing protected areas, and implementing and monitoring a fisheries management program.[21]

Fisheries have positive impacts on air, water, soil, and noise pollution. Here are some potential positive impacts of fisheries on these aspects:

1. Air Pollution:

   Sustainable fishing methods: Encouraging sustainable fishing practices, such as using fuel-efficient engines and reducing bycatch, can minimize the air pollution caused by fishing activities.

2. Water Pollution:

   Improved water quality: Proper management of fisheries can lead to better water quality as it encourages responsible waste disposal practices by fishermen and reduces the release of pollutants into the water.

[20] Khattak, R.H., Aziz, F., Ejaz-Ur-Rahman, & Zaidi, F. (2015). Ichthyofauna of river Kabul at Nowshera, Khyber Pakhtunkhwa, Pakistan. International Journal of Fauna and Biological Studies, 2, 57-61.
[21] Khyber Pakhtunkhwa Board of Investment & Trade

Ecosystem balance: Maintaining sustainable fish stocks can help regulate the balance of aquatic ecosystems, contributing to healthier water bodies and reducing the risk of harmful algal blooms and water pollution incidents.

3. Soil Pollution:

Reduced chemical usage: By promoting sustainable fishing practices, such as minimizing the use of chemicals in aquaculture and avoiding pollution from fish farm effluents, the risk of soil contamination can be minimized.

Soil conservation: Implementation of responsible fishing techniques, like avoiding destructive bottom trawling, can prevent soil erosion and protect important coastal habitats, reducing soil pollution from sediment runoff.

4. Noise Pollution:

Reduced vessel noise: Encouraging the adoption of quieter and more fuel-efficient engines in fishing vessels can minimize noise pollution, reducing the impact on marine mammals and other marine life.

It is important to note that while fisheries can have positive impacts on pollution, proper management and regulation are crucial to ensure that these benefits are realized and potential negative impacts are minimized

The following adaptation measures have been proposed to for Fisheries habitat conservation and preservation.

Table 53: Fisheries Habitat Conservation and Preservation Plan

Sr. No	Proposal	Sub – Action	Priority	Responsible Authority
1.	Developing a habitat preservation program for various fish species.	Periodically monitor the biological, chemical and physical qualities of water for existing and potential fishery sites.	Short-term	Agriculture Department
		Monitor and report unexpected fish migration/movement caused by Climate Change or any other factor.	Short-term	Agriculture Department
		Create an inventory/baseline dataset for aquatic resources.	Short-term	Agriculture Department

2.	Developing a program for aquatic resource habitat preservation.	Environmental Impact Assessment (EIA) for all commercial fisheries and hydropower projects.	Medium-term	Agriculture Department, FE&WD
		Manage existing natural habitat and find new potential sites for introduction of fisheries.	Medium-term	Agriculture Department
		Plan and implement habitat preservation for indigenous fish fauna by establishing fish protected areas (sanctuaries and reserves).	Medium-term	Agriculture Department
		Develop habitat management plans for commercially viable fish species.	Medium-term	Agriculture Department
		Promote private fish farming practices through Public-Private Partnership Schemes (PPPS).	Medium-term	Agriculture Department
		Plan the rehabilitation programs for degraded aquatic resources.	Medium-term	Agriculture Department
		Develop and propagate successful community-based fishery conservation models.	Medium-term	Agriculture Department
		Ban on the use of blasting and micro-nets for fishing.	Priority	Agriculture Department
3.	Improving the resilience of fish farming and hatchery infrastructure	Strict criteria for hatchery and fish farming site selection should be developed to avoid disaster and flood-prone areas.	Medium-term	Agriculture Department

		The design of the hatchery and fish farming structures should be strong enough to withstand any potential disasters.	Medium-term	Agriculture Department
		Promote knowledge and information sharing among relevant stakeholders, preferably local populations and sensitize them to the need of conserving valuable flora and fauna through various programs.	Medium-term	Agriculture Department, FE&WD

16.2.1.3. Kabul River Habitat Sanctuary

The Kabul River Habitat Sanctuary will be a habitat of ichthyofaunal diversity and species of birds including waterfowls. The sanctuary will also vital to migratory birds and other wildlife of the region to enhanced the biodiversity richness. This flourishing urban sanctuary ecosystem will be influenced habitat conservation resulting in fresh water diversity that creates a dynamic and sustainably rich environment with high biodiversity. In addition to conservation and protection of this rare natural resource, the Sanctuary's goal also includes promoting environmental values and enhancing Sanctuary habitat.

Sanctuary will also help to promote the understanding toward physical environment, biological environment and interacting relation between human and wild resources. It also helps to promote research opportunities and the recreational values of the region.

This river sanctuary will serve as a flood protection site, with terraces of agriculture that protects the nearby Peshawar city from the flood. The sanctuary will also provide a recreation spot for the resident of Peshawar city and the nearby community, with amenities that includes walking tracks, cycling track, picnic spots, natural scenic spots etc.

16.2.1.4. Wildlife and Biodiversity

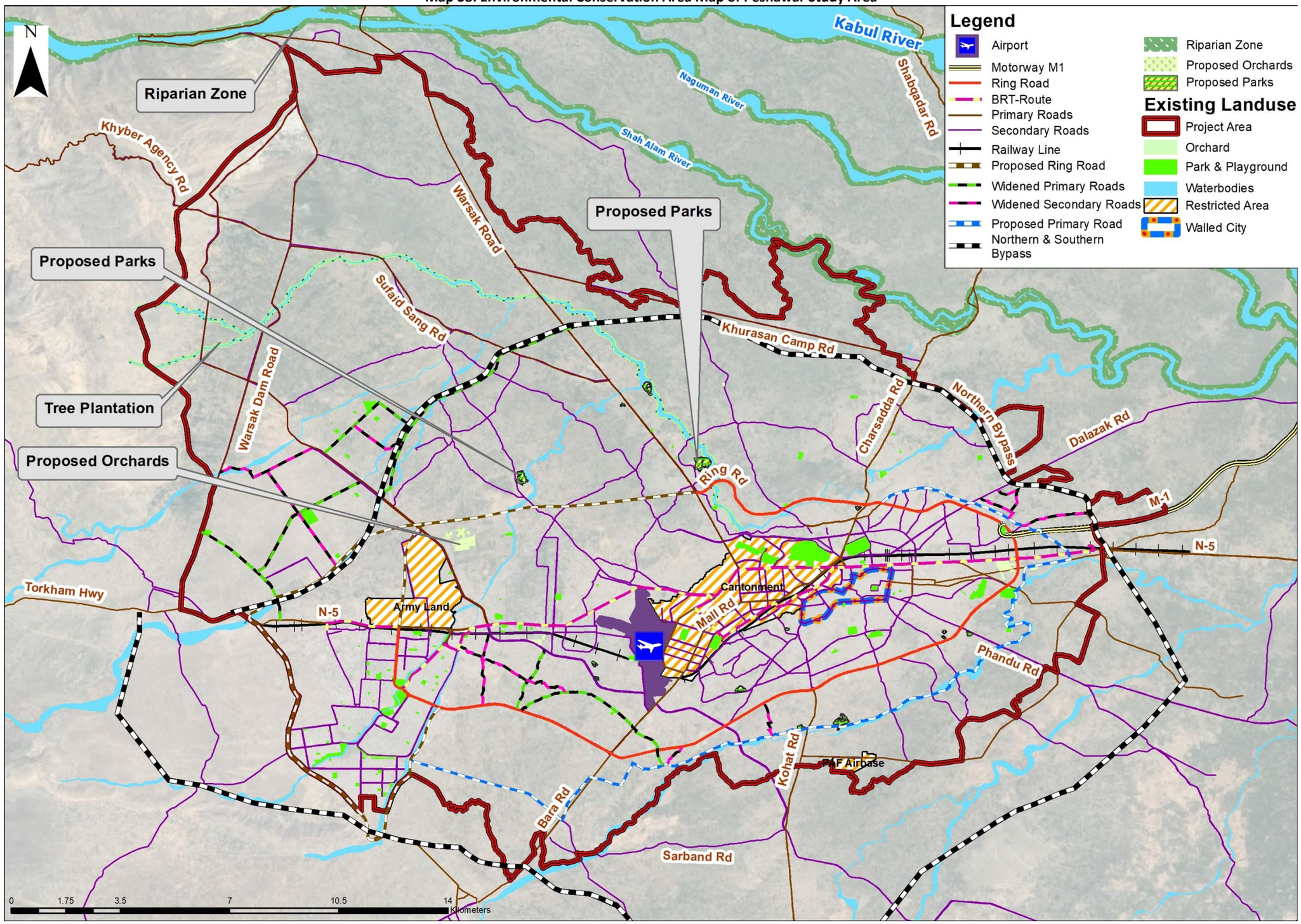
The following adaptation measures have been proposed to for Fisheries habitat conservation and preservation.

Sr. No	Proposal	Sub - Action	Priority	Responsible Authority
1.	Strengthening of legal and institutional frameworks to materialize efforts towards biodiversity conservation.	Encourage the enhancement of biodiversity conservation efforts; support public and political sensitization activities to make biodiversity conservation as one of the top priority agendas.	Short Term	P&DD, FE&WD, WWF
		Take concrete steps to implement the previously developed Biodiversity Strategy and Action Plan.	Short Term	P&DD, FE&WD, WWF
		Review and update the existing plans regularly based on lessons learned during the practical implementation phases.	Short Term	P&DD, FE&WD, WWF
2.	Improving scientific research and biodiversity conservation implementation	Conduct applied research on biodiversity conservation in KP in the wake of Climate Change.	Medium Term	P&DD, FE&WD, WWF
		Document and incorporate indigenous knowledge into the latest scientific research findings/information	Medium Term	P&DD, FE&WD, WWF

		for use in conservation planning and activities.		
		Extend conservation techniques in collaboration with local communities, utilizing their knowledge from a local perspective.	Medium Term	P&DD, FE&WD, WWF
		Integrate biodiversity conservation strategies into all relevant sectors including forestry, wildlife, aquatic and agriculture.	Medium Term	P&DD, FE&WD, WWF
		Encourage both in-situ and ex-situ conservation of valuable species for research and other uses in biodiversity-rich areas.	Medium Term	P&DD, FE&WD, LGE&RDD, Agriculture Department, Energy & Power, Irrigation Department, WWF

The map below is showing the Environmental Conservation areas of Peshawar city;

Map 38: Environmental Conservation Area Map of Peshawar Study Area



Source: M/S PEPAC Pvt Ltd & Associates

16.2.1.5. Air Quality Improvement Plan

Clean air is essential for all forms of life. Generally, clean air has no harmful pollutants or emissions in it, and is safe to breathe. Human activities such as transportation, loose dust, and emissions from industrial processes are major contributors to contaminate air quality. Air pollution can have significant negative impacts on human health, ecology and on the environment.

Air pollution is considered as one of the global concerns and a major threat to human health, food security, ecology and environment. It is one of the unavoidable problems during the process of urbanization and industrialization. Every year around 4.5 million people die due to outdoor air pollution reported by Lancet Commission on Pollution and Health. According to WHO concentration of various pollutants shouldn't increase the mentioned standard concentrations the safeguard human health. In Pakistan, these standards are termed National Environment Quality Standards (NEQS).

Air pollution is considered hazardous among all types of environmental pollution for the reason that all living creatures need air for normal functioning. One study found that even trees in the contaminated area decayed early than expected. Environmental impacts may include reducing the growth and productivity of vegetation as well as impacts on fish and wildlife. Green House Gas Emissions (GHG) are related to poor air quality, gases that absorb radiation from the sun and trap heat in the atmosphere. To protect local air quality as well as mitigate climate change, it is important to reduce emissions. As of now, the project city is going to be developed and more industrial and construction activities will be taking place so it is the possibility that it may cause serious health concerns for the community as well as for the surrounding environment.

Following precaution measures needed to be implemented for curbing air pollution in the project city.

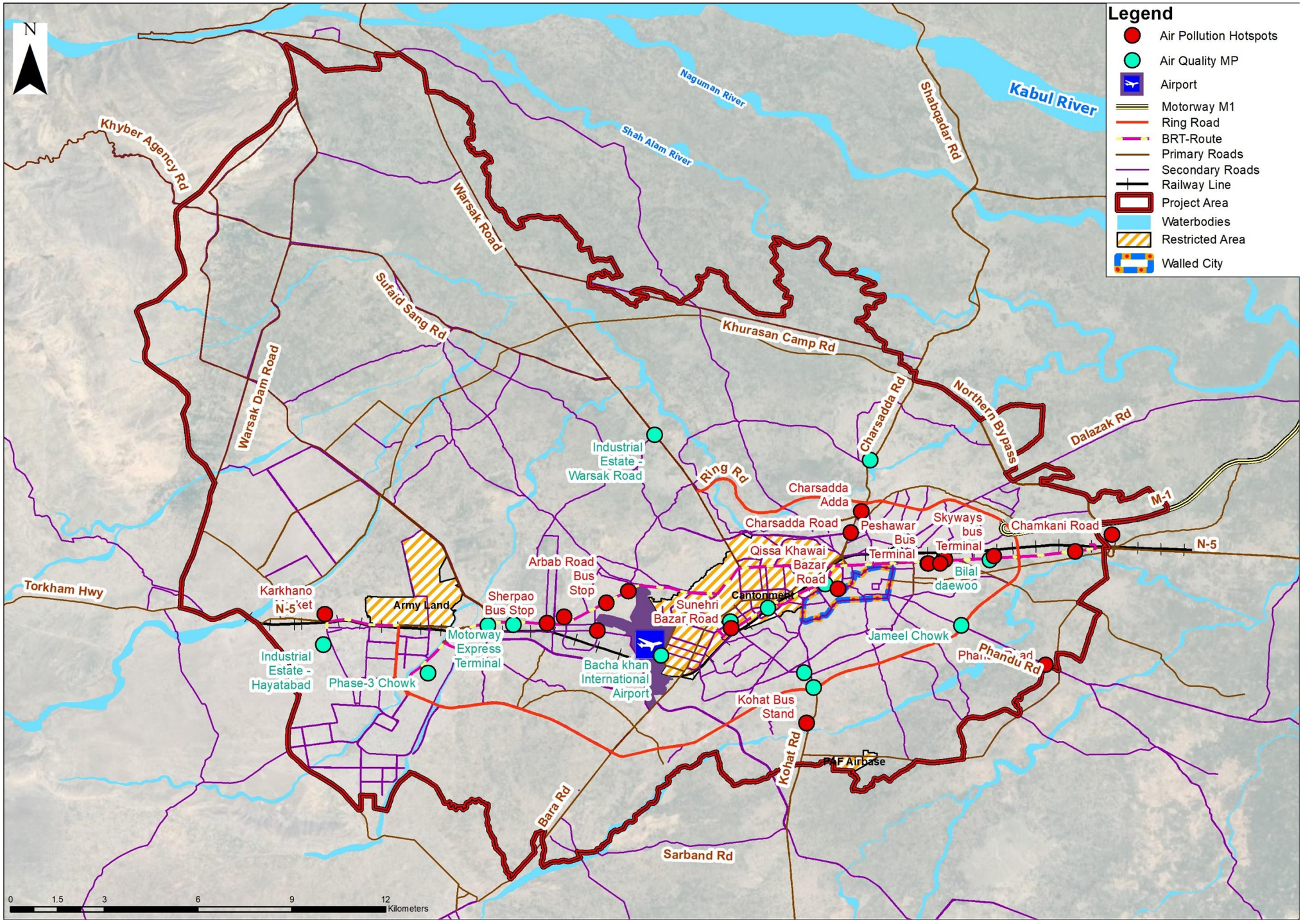
Table 54: Strategic Environmental Enhancement Measures for Air Quality

Sr. No	Strategic Environmental Enhancement Measures
1.	Increase the use of environmentally friendly products in City facilities to improve indoor air quality.
2.	Setting up continuous monitoring stations to record pollution or GHG levels in ambient air along with in the city, especially near the industrial area.
3.	A rigorous review of the Motor Vehicle Ordinance for inspection of private vehicles is recommended.
4.	Restrict conversion of vehicles from gasoline to second-hand diesel engines.
5.	It is mandatory for owners and drivers to check their vehicles for air pollution at least every six months and keep the emission under while using the vehicle on road.
6.	Impose a proper limit on the operating life of vehicles or link it to certain efficiencies.
7.	Improvement of energy efficiency in vehicles. With a view to reducing vehicular air pollution, vehicle manufacturers are introducing new vehicles in the market

Sr. No	Strategic Environmental Enhancement Measures
	with eco-friendly alternative fuels like electricity, Battery operated, etc. which have less or zero emission of pollutants.
8.	Green buildings should be proposed in new developments by following criteria's developed by Pakistan and international Green Building Councils. The green building minimizes the adverse impacts on the environment (air, water, land, natural resources) through optimized building siting, optimized building design, material selection, and aggressive use of energy conservation measures.
9.	Launching an effective awareness campaign against smoke-emitting vehicles.
10.	To check the quality of fuel at fuel dispensing stations and to stop adulteration of fuel during transportation; roadside sale of fuel, unauthorized sale of naphtha, sale of low-class lubricants, etc. need to be prohibited.
11.	Introduction of low-Sulphur diesel and promotion of alternative fuels such as CNG, LPG, and mixed fuels.
12.	Vigilant and Green transportation plan. Establishment public/rapid transit systems, bicycle lanes, parking policy and imposing of parking surcharge on illegal parking.
13.	Encourage carpooling and ridesharing.
14.	The green tax could be imposed on fuel and electricity usage. The green tax in return could be used for growing trees, urban forestation and plantation drives.
15.	Affordable and attractive fares policies should be introduced for public transport to reduce vehicular pollution.
16.	Resolve slow traffic movement in urban areas contributing to huge quantities of GHG emissions, and in wastage of petroleum products.
17.	Establishment and enforcement of green buffer zones around industrial area, factories and populated vicinities in the city.
18.	Adoption of Green technologies, adoption of 5R Strategy, shifting of industries into a separate and less populated/ sensitive areas, control of hazardous emissions and development of green belts over a large area in the city.

Source: Devised by Consultants

Map 39: Air Pollution Hotspots in Peshawar Study Area for Improvement



Source: M/S PEPAC Pvt Ltd & Associates

16.2.1.6. Noise Quality Improvement Plan

Sound is essential to our daily lives, but noise is not. Noise is generally used as unwanted sound or sound which produce unpleasant effects and discomfort on the ears. Noise can create from many sources including household, industries, generators, and transportation etc.

In case of Peshawar, Transportation is the major source of noise pollution. As the city is getting urbanized by-passing time, so the increase in traffic volume, traffic jams and congested areas has given rise to increase in noise.

Noise near the airport area is also exceeding because of airplanes. Airports are situated in the vicinity of population centres and the airplanes pass over residential area. Heavy trucks, busses, trains, motorcycles, scooters and jeeps also contributes to increased level of noise. Noise pollution can be controlled by the following methods:

A. Industrial Sector

As the city is going to be more developed in the future and more industrial activities are going to be taken place. The ambient noise levels can be reduced, and the noise quality could be improved by adopting the following measures.

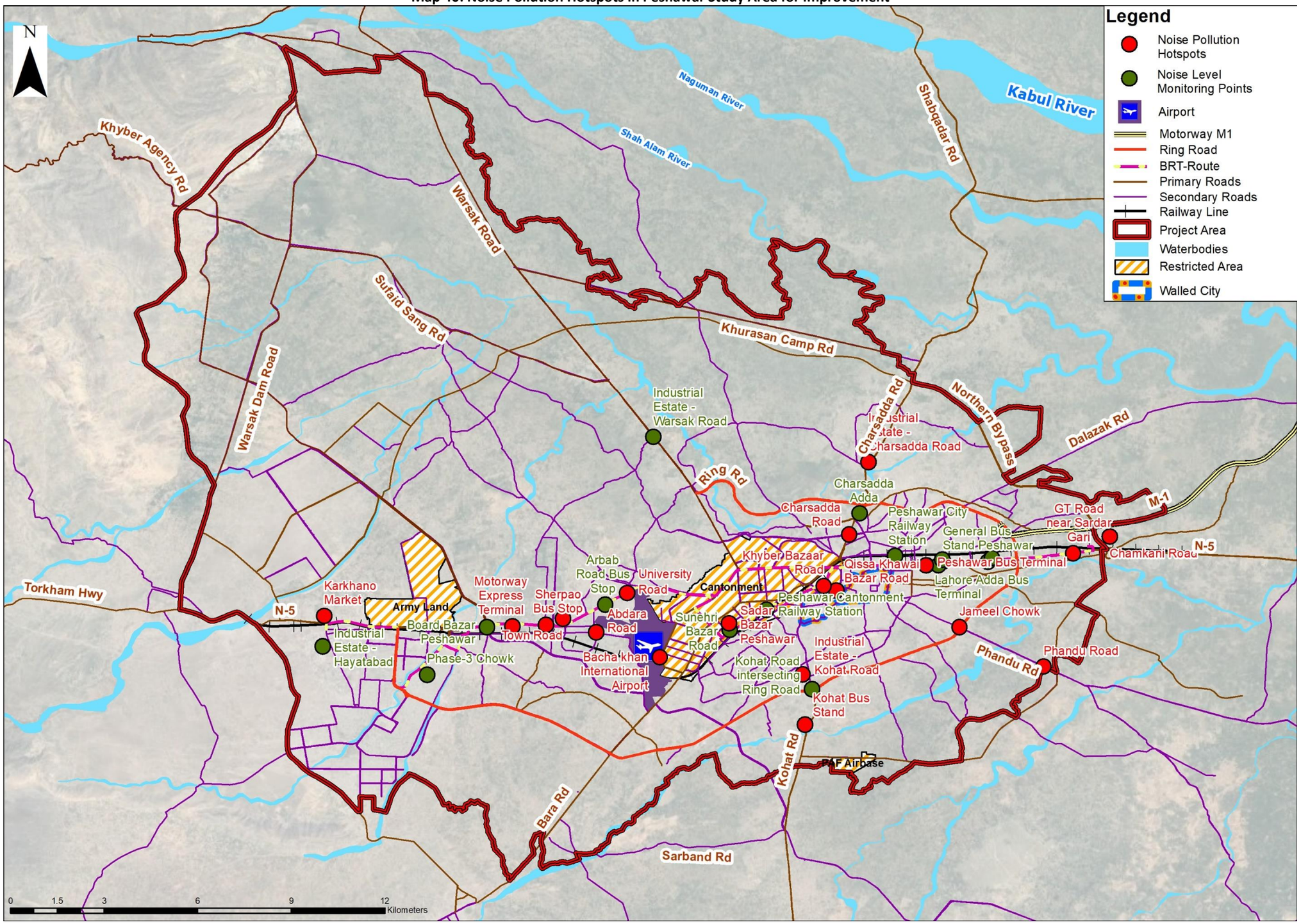
Table 55: Strategic Environmental Enhancement Measures for Noise Quality Improvement

Sr. No	Strategic Environmental Enhancement Measures
Industrial Sector	
1.	Improvement in design and operations of machinery.
2.	Installation of noise barriers.
3.	The development of green belts as a buffer can also help in reducing urban noise levels to great extent.
4.	Reduce wheel-rail contact noise by well-maintained rails, wheels and usage of disc brakes.
5.	Innovations in rail engine and track technology
Residential Sector	
6.	Monitoring and enforcement noise standards in residential areas.
7.	Imposition of restrictions on traffic hours.
8.	Imposing restrictions on operation hours for various urban functional zones.
9.	Establishment of suitable buffer zones around residential areas to insulate from noise emanating areas such as industrial, commercial, road, railway traffic, etc.
10.	Traffic signs are required to place on obvious points, especially, near hospitals, schools, and residential areas.
11.	Vehicle horns and especially pressure horns must be prohibited within city areas.

Sr. No	Strategic Environmental Enhancement Measures
12.	Implement zoning controls and other land-use policies to limit or avoid the proximity of noisy and noise-sensitive uses.
13.	Subsidize acoustical retrofits (e.g., double pane windows, mechanical ventilation) for existing residential buildings near traffic noise sources.
14.	Implement and enforce stringent policies limiting the use of construction equipment at night.
15.	Control of vehicle speed and maintenance of streets can limit general traffic noise.
16.	Adopt building standards to require quiet interiors.
Commercial Sector	
17.	Setting up of road or rail noise barriers.
18.	Municipalities can purchase quieter public service and transit vehicles (e.g., electric and hybrid buses). They can also monitor and regulate private refuse service vehicles.
19.	Ensure machinery and equipment are installed in new buildings as quietly as possible.
20.	Implement and enforce noise standards for loud machinery and equipment and can restrict the use, location, or timing of specific equipment or activities to protect health and sleep.
21.	Permit and monitors entertainment venues requiring building insulation and limiting hours of operation.

Source: Devised by Consultants

Map 40: Noise Pollution Hotspots in Peshawar Study Area for Improvement



Source: M/S PEPAC Pvt Ltd & Associates

16.2.1.7. Water Quality Improvement Plan

Access to clean potable water needs to be recognized as a limited resource. New integrated water management approaches that encompass the economic, social, and environmental benefits of water conservation and water quality protection are critical to address this vital resource. The water quality related objectives and related actions relate to managing water resources through:

Potable Water Conservation

Reducing consumption and encouraging wise use of potable water.

Water Resources Management

protecting and enhancing Wana's watersheds to improve water quality.

Storm Water Management

Increasing the use of captured or recycled site water and reducing and managing storm water runoff with proper rainwater harvesting techniques.

Wastewater Treatment

- Protecting exiting water resources from contamination and reduction in water usage.

A. Potable Water Conservation

Cities largely depend on clean water for drinking, a healthy natural environment, recreation, household and commercial uses, sewage treatment, and many other functions. The water and Sanitation department is responsible for the treatment and distribution of potable water supply, which is drawn from rivers and underground resources. The conservation of drinking water should be ensured by the following measures;

Table 56: Strategic Environmental Enhancement Measures for Potable Water Conservation

Sr. No	Strategic Environmental Enhancement Measures
1.	Develop and implementation of city specific policies to promote sustainable urban development including buildings and facilities that support reduced water consumption.
	a. Develop policies and standards requiring new development applications to submit a water conservation plan those details proposed water reduction targets, tactics, and water-saving devices. **b.** Develop a plan to install water-conserving technology and/or retrofit low-flow fixtures.

Sr. No	Strategic Environmental Enhancement Measures
	c. Implement wastewater and greywater demonstration projects (e.g., grey-water recycling, composting toilets).
2.	Work with people, NGOs and Academia to communicate the value of water and its conservation.
3.	Collect and reuse the swimming pool and mosque's ablution area water to irrigate local parkland and sports fields, as appropriate.
4.	Develop and distribute public information on water efficiency.
5.	Support Landscaping Program that encourages the planting of native species to reduce watering requirements for residents, industrial, commercial, and institutional land uses.
6.	Support the WASA to systematically reduce leakage in the water distribution systems. Introduction of water metering system to avoid water wastage.
7.	Monitoring potable water consumption of residential and industrial/commercial/institutional users.
8.	Development of Environmental Monitoring plan to Monitor the surface water quality in the city.

Source: Devised by Consultants

B. Ground Water Quality

The discharge of sewerage, industrial wastewater, agriculture runoff, urban sprawl, livestock sheds, and industry, ultimately deteriorated the water quality as well as quantity. Surface water is the sole source of groundwater aquifer recharge along with rainfall. Consequently, unplanned development scenario keeps on adding threats to the groundwater quality.

Table 57: Strategic Environmental Enhancement Measures for Ground Water Quality

Sr. No	Strategic Environmental Enhancement Measures
1.	**Rainwater harvesting** should be a mandatory part in all the building structures in the new developments. Rainwater harvesting helps increase the water table, improve the quality of groundwater and reduce tube well-pumping costs.
2.	WSSP should take relevant measures to control demand by reducing per capita water availability by educating households to use water more wisely.
3.	The incentive programs should be launched to promote water conservation by giving initiatives to homeowners and businesses to encourage to install of plumbing fixtures and appliances with water-efficient models.
4.	Use high-efficiency irrigation for Urban farms such as drip irrigation instead of flood irrigation.

Sr. No	Strategic Environmental Enhancement Measures
5.	In order to promote the culture of water conservation, a metering system should be introduced to charge water on a volumetric basis. This will help in reducing water use, in the same way as is being done for electricity, gas, and other utilities.
6.	An integrated water resource management approach should be adopted by involving all stakeholders for the protection of water quality. The linkage between research and development needs to be strengthened.

Source: Devised by Consultants

These actions may help in the management and mitigation of water-related commercial risks in the context of new development projects in the city. Also, these mitigations will be adopted by involving key stakeholders (e.g., communities, NGOs, government bodies, suppliers, and employees) as part of risk assessment, long-term planning, and implementation activities.

C. Stormwater Management

Stormwater management involves integrated best practices, from sediment and erosion control to quantity and quality, to measures that can be implemented in front and rear yards, parking lots, and along roads, and pollution prevention. Most of these efforts are intended to provide efficient water management to protect life and property from the hazards of stormwater and flooding. Furthermore, to protect natural features that are reliant on clean surfaces and groundwater, particularly streams and wetlands that provide sensitive fish and wildlife habitats.

Table 58: Strategic Environmental Enhancement Measures for Stormwater Management

Sr. No	Strategic Environmental Enhancement Measures
1.	Develop a residential stormwater management utility fee to help fund stormwater management retrofits and maintenance.
2.	Develop and implement a stormwater management facility maintenance strategy.
3.	Undertake low-impact development projects and strategies such as rain gardens, porous pavement, etc. as part of road or parking lot reconstruction and development projects.
4.	Usage of parks for temporary excess rainwater storage and low-impact development features to deter basement flooding.
5.	Protect, preserve, and enhance the urban natural areas and wetlands which naturally provide flood control.
6.	Acquire lands to enhance flood protection. Flood protection studies should be carried out to avoid flood damages and to protect the health and safety of the community.

Sr. No	Strategic Environmental Enhancement Measures
7.	Establish guidelines that will require the City to consider the installation of a green roof for the reconstruction, development and/or replacement of existing roofs at City-owned buildings and facilities.

Source: Devised by Consultants

D. Wastewater Treatment

Table 59: Strategic Environmental Enhancement Measures for Wastewater Treatment

Sr. No	Strategic Environmental Enhancement Measures
1.	Invest in existing sewers, Improvement and rehabilitation of sewer network.
2.	Install decentralized waste treatment plants in designated places to conserve and treat water.
3.	Reduce water pollution discharges from City operations. **a.** Buy and use product alternatives with lower toxic levels (for example, natural fertilizers, such as compost or peat, environmentally friendly cleaning products). **b.** Replace pesticides with herbicidal vinegar in parks and green areas to reduce environmental pollution where practical. **c.** Rehabilitation of existing landfills or waterways. **d.** Development of landfill sites and dumping sites for proper waste disposal. **e.** Implementation of tree plantation adjacent to watercourses to improve the water quality before the stormwater runoff.
4.	The industrial sector should be encouraged to provide a complete recycle/reuse system for water conservation, preferably by adopting the Zero Liquid Discharge facility. For this purpose, government to provide subsidies and funding to the industrial sector to introduce green practices in the city.
5.	Identify the suitable locations and Sewerage and wastewater treatment plants should be installed for proper treatment of sewerage and waste water.
6.	Vehicle service should be encouraged with no or little water usage to conserve the water resource.

Source: Devised by Consultants

E. Surface Water Management

The existing situation of surface water is devastating. In addition, untreated municipal effluents of are disposed of in the surface water. The discharge of untreated municipal and industrial effluents has converted the water resources into a sludge carrier in Peshawar

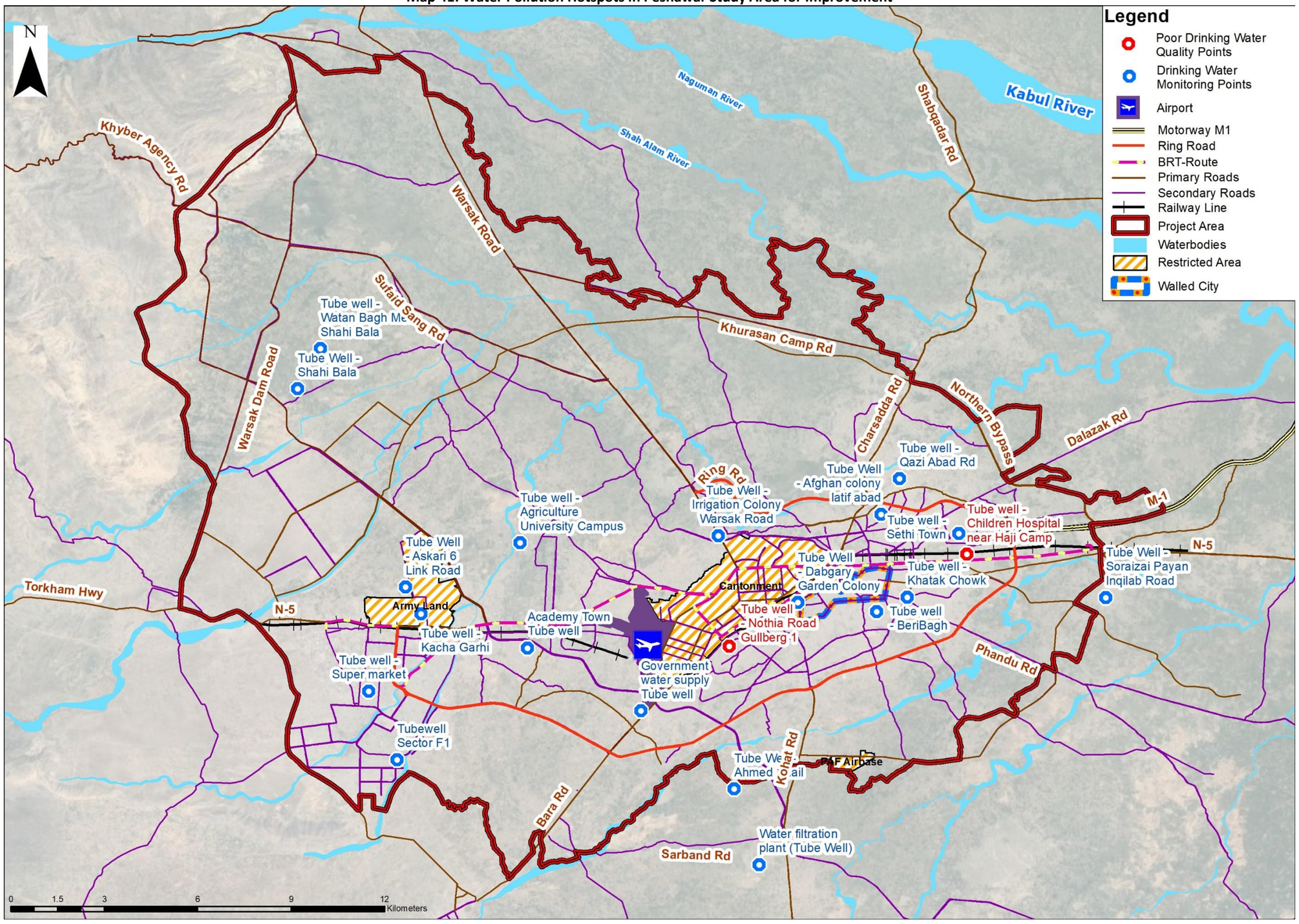
city. The strategic mitigation measures in order to cater the surface water pollution is here as under.

Table 60: Strategic Environmental Enhancement Measures for Surface Water Management

Sr. No	Strategic Environmental Enhancement Measures
1.	Regular Flushing of surface water bodies is required to flush out the deposited sediments. Natural flushing can happen during the flooding season but steps must be taken in case natural flushing is not been happening. The flushing will have a positive impact on the life of the water body and the downstream ecosystem.
2.	Sedimentation Management Plan is needed as part of the River Basin Management Plan to be developed.
3.	Wastewater treatment plants should be proposed to reduce surface water pollution, and to treat, reuse and recycle water.

Source: Devised by Consultants

Map 41: Water Pollution Hotspots in Peshawar Study Area for Improvement



Source: M/S PEPAC Pvt Ltd & Associates

16.2.1.8. Climate Change

The current state regarding climate change revealed that Pakistan is rated among the top 10 most vulnerable countries to climate change. Increased risks of Extreme Events (floods, urban heat Iceland, extremely high/low temperatures, etc.); Severe water- and heat-stressed conditions in arid and semi-arid regions leading to reduced agricultural productivity; Increase in Deforestation; Loss of Biodiversity; Health Risks.

The Development of different cities (Eco-cities, health city, Sports cities, knowledge cities) will definitely change the existing land use of the city. As land-use changes can exacerbate the impacts of changing climate. Thereby, in the new proposed developments, where high housing and commercial demand is projected in the future, vertical building structures are already included to encourage to minimize the land-use changes, leaving more green spaces which will ultimately lead to less variability in climate over time.

Table 61: Strategic Environmental Enhancement Measures for Climate Change

Sr. No	Strategic Environmental Enhancement Measures
1.	The Forest area is planned to be expanded with increased green belts and tree plantations along roadside railways and walking tracks and ecocities. Forests and urban green spaces will deliver substantial economic benefits to whole city by mitigating a wide range of the expected impacts of climate change and is the safest, most reliable means of realizing several of sustainable development goals.
2.	A concept of green walls should be introduced in vertical building patterns to mitigate the GHGs and to gain multiple environmental benefits at the same time.
3.	Low impact development and green building infrastructure can reduce both urban heating and air pollution.
4.	In the walled city area, where sufficient green places cannot be developed, a concept of green walls should be introduced in vertical building patterns in the urban area to mitigate the GHGs and gain multiple environmental benefits at the same time.
5.	To cope with adverse impacts on agriculture, it is important to introduce climate-resilient varieties of agriculture.
6.	It is necessary to plan the cultivation of crops by considering the changing of seasonal patterns.

Source: Devised by Consultants

Chapter 17: Urban Regeneration Zone Proposal

The term heritage generally covers any building, monuments, sites, areas of archaeological importance or landscape identified as having a degree of significance because of its historical or cultural character. This calls for the designation, preservation, protection and enhancement of historic resources (buildings, structures, sites and objects) which reflect significant elements of the city's cultural, social, economic, political, architectural, historical, archaeological, ethnographical or other heritage. It encompasses many things – the way of life, traditions, history and values. It is also reflected in the natural and cultural diversity of places and objects that help to understand the past. Cultural heritage significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.

The city of Peshawar and its suburbs are full of cultural heritage buildings and sites. The earliest of the existing structures date generally onwards from the mid-Mughal Era of Emperor Shah Jahan. Ancient archaeological sites, otherwise obscure but known -- such as "Shahji Ki Dheri" – relating to Kushan Emperor Kanishka's famous Buddhist "vihara" of 1800 years ago – exist, and artifacts from the Indo-Greek period in Gandhara 2200 years ago, have been found in excavations conducted at the Gor Ghatri. Besides these, there are many Hindu, Sikh and Muslim structures and graveyards which are within the city limits of the city district that come under the classification of antiquities. Most of these are still in use.

Peshawar city is one of the oldest cities in Pakistan and South Asia and has several historical, heritage and cultural sites, however, the existing situation of those sites is abysmal and require regeneration and upliftment. For that purpose, the consultant has suggested following proposals:

17.1. Regeneration of Walled City Peshawar

The overall area covered by the old city have varied over time, however some of the central points have remained the same. The highest spot of the city is considered to be Qila Bala Hisar and the city had been divided into three different areas. One area is of Gor Kathri Ruins with

Karimpura to its north-west and Pipalmandi to its south-west. At present time, there are several small lanes present in this area. One of them starts from Chowk Yadgar and goes to Gor Kathri and after going through Karimpura, it ends up at Hashtnagari and Lahori Gates. Another lane begins from Pipalmandi and proceeds towards Ganj and Ekkatut (Yakatut) gates. This area consists of the famous Mahabat Khan mosque and the mohalla of Dhakki Nalbandi forms an adjunct of this part. This whole area is again a high ground with shops of jewellery and of the famous Peshawari Lungis (turbans).

Another area lies between the Kohati Darwaza channel and the Qissa Khwani channel where the local variety of felt caps are made. In this area, famous points are Sard Chah (cold water well), Namakmandi. which in the old times was the hub of the grain market but now the grain

shops have been transferred to Pipalmandi and areas leading up to Sar Asiya Gate, Sard Chah Gate, Saraki Gate, Bajauri Gate and Dabgari.

This entire area has been marked as urban regeneration zone and is suggested by the consulted that it should be restored in order to increase the tourist traffic in Peshawar and also to ameliorate the existing local businesses within the area. In addition to this, Qissa Khawani Bazaar which is a central element of the walled city and is one of the oldest bazaars of Peshawar having the history of over 400 years, has also been suggested to be restored and repaired to lift the tourism related economy of the walled city.

17.2. Further Restoration of Gor Khatri Ruins

From archaeological, heritage and historical point, the Gor Khatri Ruins are of immense significance. Over the years, some restoration work had been initiated by the government and the archaeological site has been preserved to an extent. It has been further suggested to repair the existing ruins in order to protect the history of the area. This will also play a role in strengthening the tourism industry by displaying Peshawar's colourful, multicultural, and multi-faceted past.

Chapter 18: Quality of Life

18.1. Background

The concept of physical living environment constitutes built and natural environment like cleanliness of the indoor and outdoor environment, condition and sufficiency of housing and social and functional aspects and those affecting the quality and circumstances of life. Different population groups have different needs and wishes for their living environment, depending on their age or other situations in life. To improve the overall quality of life of any area, it is essential that needs and requirements of each age group and income group are fulfilled, however, for a developing country like Pakistan which is facing severe economic crisis, catering to the needs of each age group and income group does not take precedence. This coupled with absence of comprehensive data with respect to each age and income group's needs and wishes, it is exceptionally difficult, if not impossible to provide for all.

The primary data collected from land use survey and in-person interviews in Peshawar provided basic data depicting that opinion about overall quality of life was divided in equal parts with half of the people being satisfied with the overall quality of life and half being dissatisfied. The main points raised in assessment related to physical environment, transport, education facilities, health facilities, unemployment, civic and public spaces, security and parks and green spaces. Proposals for each point have been given in their respective section and this section provides policy recommendations and proposals for improving physical health, parks and green spaces, and unemployment.

18.2. Proposals for Improving Quality of Life

Following are some general proposals to improve the quality of life for the citizens of Peshawar City. The detail of these proposals will be discussed in Task D: Action Plan for Quality of life.

- In regard to improving physical health, excluding improvements in health facilities which will be catered for in Task D: Action Plan for Health Facilities, the focus has been encouraging more physical activity among the people which in turn can reduce several health issues like cardiovascular issues, blood pressure, and immunity problems etc. which will have a snowball effect and provide social and economic benefits.
- It is recommended that the civic places should be improved. Proposals for each civic place include the requirement of additional places and maintenance guidelines for the improvement of the existing and proposed facility to improve access to each facility and its quality.
    a. *Establishment of Public Toilets*
    b. *Upgradation of existing and new proposed bus stops (details of those are provided in the section of transportation proposals) should be constructed keeping in view*

seven elements i.e., safety, thermal comfort, acoustic comfort, wind protection, visual comfort, accessibility, and integration.

- Provision of green spaces should be ensured within frontage on an arterial road with views into and out of the site.
  a. *Greenspace perimeters should have trees and a naturalized appearance. It should be located in or proximate to institutional, commercial or industrial areas with buffers provided for lit areas.*
  b. *The greenspace should be well organized with defined/clustered recreation/athletic facilities. A centrally located building should house public washrooms, concessions, storage, change rooms, etc. An internal pedestrian network should link all facilities and connect to the city-wide pedestrian system.*
- Improvement of sports ground including regular maintenance of the grounds, adequate lighting, presence of proper drainage system, provision of comfortable and safe seating arrangement, adequate parking facilities, easy accessibility, and ensuring a safe and secure environment for females so that they can practice and play without worrying about harassment.
- Food Outlets; grocery stores and general stores should be improved by implementing strict hygiene standards in stores, developing and implementing policies and regulations to maintain hygiene and quality standards in stores, and investing in the development of infrastructure such as roads, and electricity in the area to make it easier for store owners to access the necessary resources and supplies.
- Pedestrian-friendly infrastructure: It is suggested to make the city more pedestrian-friendly by creating wider sidewalks, more crosswalks, and reducing speed limits in residential areas. This will make it easier and safer for people to walk and cycle around the city.

Chapter 19: Citizen Behaviour

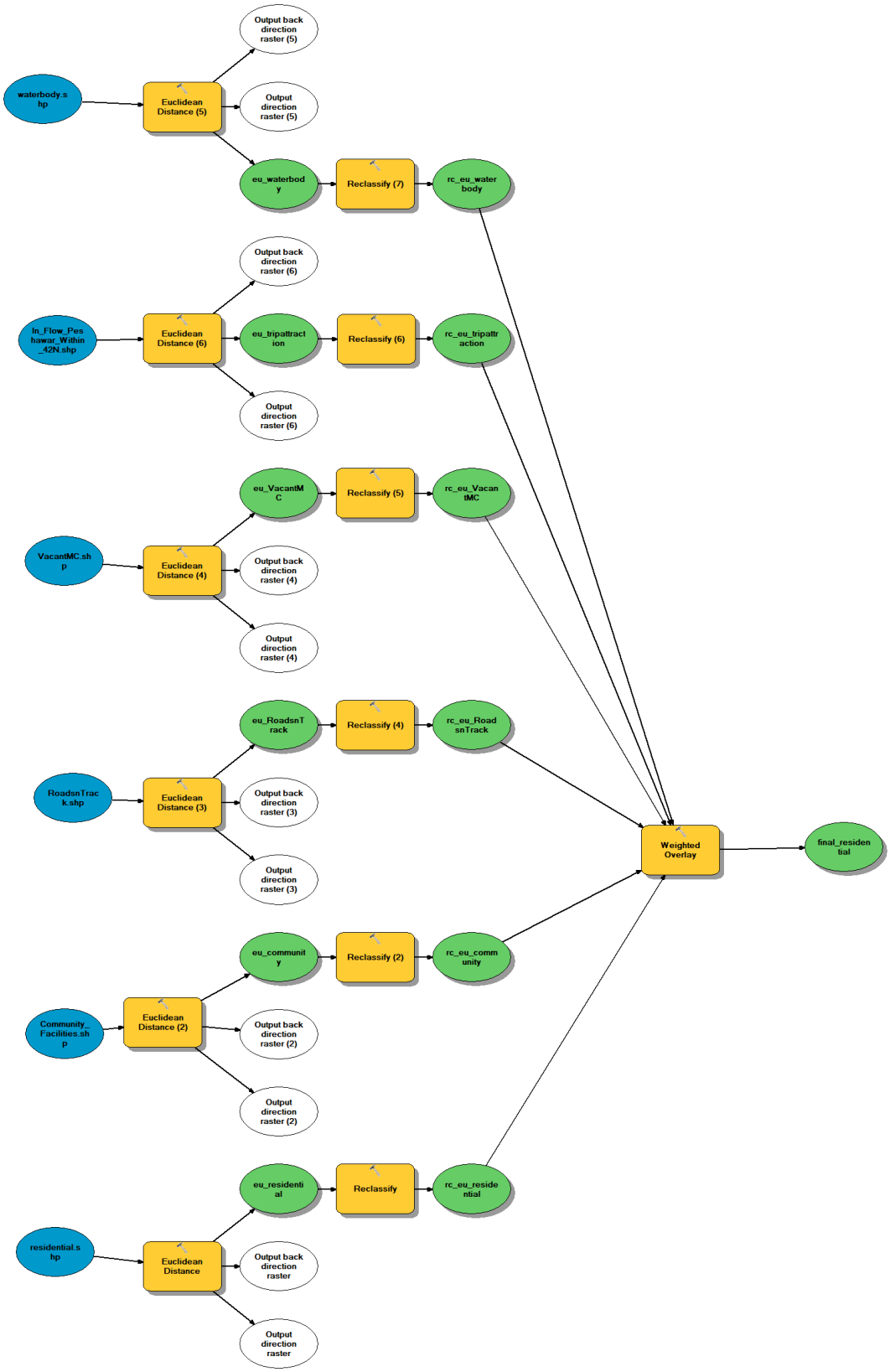
The survey to determine citizen behaviour in the city included questions regarding knowledge, attitude and practices of general public concerning solid waste in the city, vandalizing, and damaging of the public property, tourism in the city and working on the different government departments. The results have indicated that people believe on less waste should be generated to safeguard nature and environment while stating that the reasons behind high waste generation and pollution include lack of awareness and education among general public about proper disposal is a major reason followed by 36.3% stating that there is absence of proper facilities to dispose of the waste. Similar conclusion had been drawn in regard to vandalising of public property. Further, since Peshawar is not a tourism focused city, other than the religious tourism, the attitude towards tourism enhancement seemed to be neutral. Majority is satisfied with the working of various departments but had highlighted corruption, improper functioning, and bribery as main reasons behind dissatisfaction.

19.1. General Proposals

- The government should focus on implementing better waste management facilities and infrastructure to support the proper disposal of waste.
- It is also important to address the issue of vandalism and public property damage by increasing awareness among citizens and implementing stricter laws to discourage such behavior.
- The government should also focus on addressing corruption, improper functioning, and bribery in different departments to ensure efficient and transparent governance. Overall, there is need for a holistic approach that includes education, awareness, infrastructure development, and effective governance to improve citizen behavior in Peshawar City.

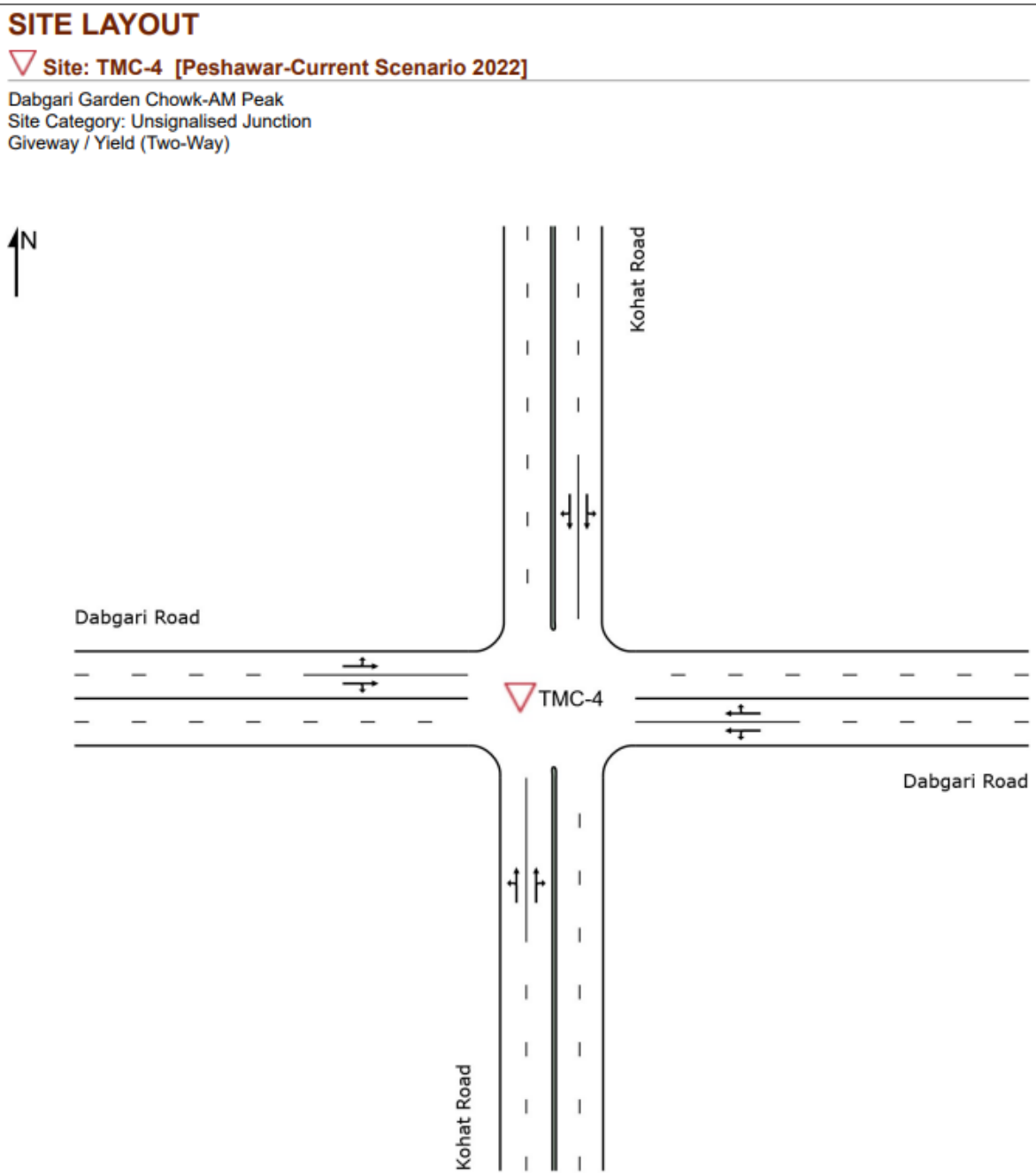
Annexure

1. GIS Model of Multi-Criteria Model



2. SIDRA Analysis of Dabgari Garden Chowk

Figure 31: Dabgari Garden Chowk Site Layout (Current Scenario: AM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 32: Dabgari Garden Chowk Movement Summary (Current Scenario: AM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar-Current Scenario 2022]

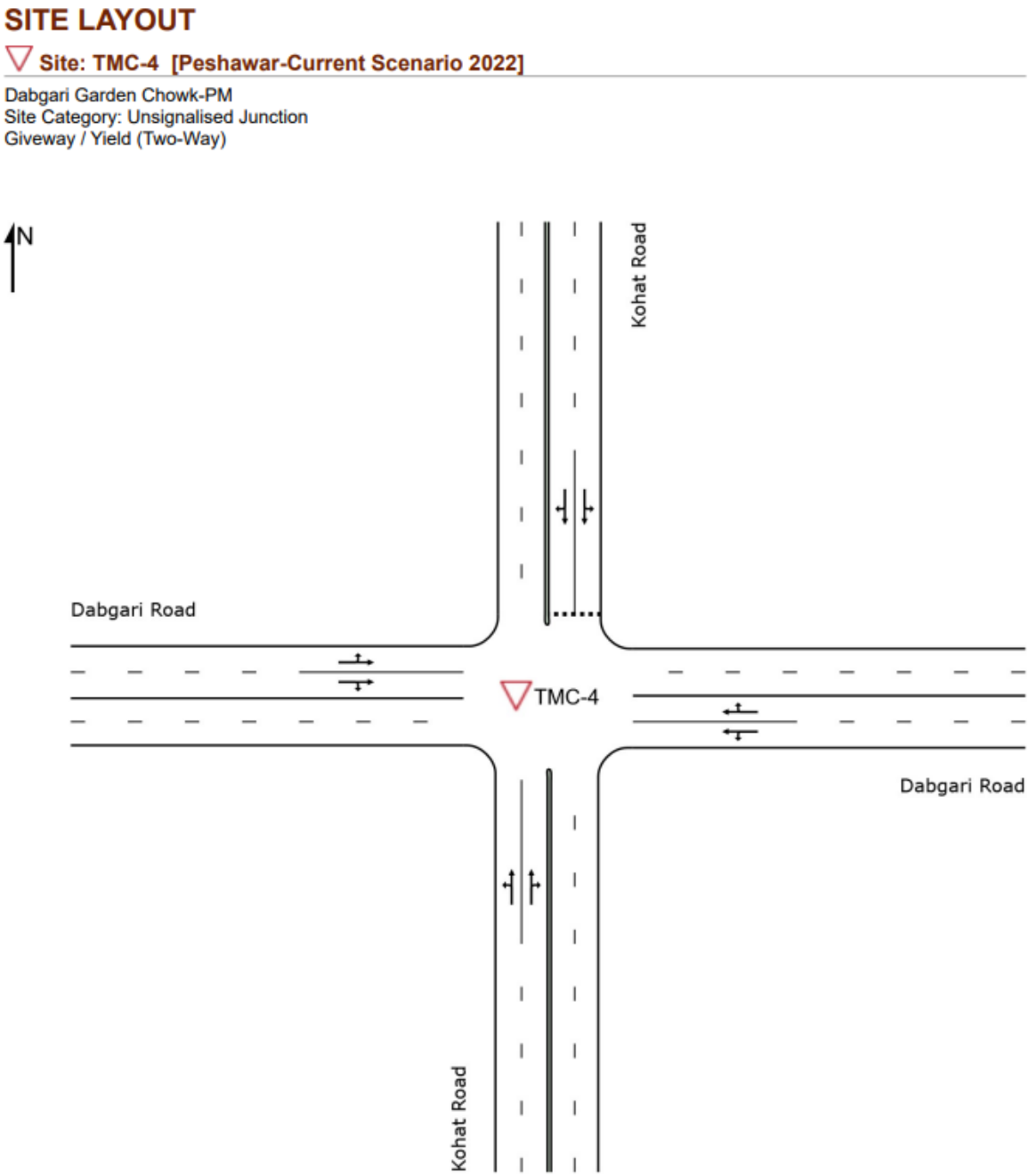
Dabgari Garden Chowk-AM Peak
Site Category: Unsignalised Junction
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	59	0.0	0.420	6.5	LOS A	2.4	17.1	0.41	0.32	0.41	55.9
2	T1	527	0.0	0.420	2.0	LOS A	2.6	17.9	0.40	0.35	0.44	56.3
3	R2	48	0.0	0.420	21.6	LOS C	2.6	17.9	0.39	0.40	0.49	53.3
Approach		635	0.0	0.420	3.9	NA	2.6	17.9	0.40	0.35	0.44	56.0
East: Dabgari Road												
4	L2	97	0.0	0.275	6.9	LOS A	1.3	8.9	0.44	0.47	0.44	54.5
5	T1	129	0.0	0.275	2.5	LOS A	1.3	8.9	0.44	0.47	0.44	55.9
6	R2	108	0.0	0.634	38.5	LOS E	2.6	18.4	0.93	1.11	1.49	36.1
Approach		335	0.0	0.634	15.4	NA	2.6	18.4	0.60	0.68	0.78	47.2
North: Kohat Road												
7	L2	139	0.0	0.516	10.3	LOS B	3.8	26.9	0.65	0.83	0.96	51.4
8	T1	221	0.0	0.516	7.4	LOS A	3.8	26.9	0.67	0.85	0.98	51.6
9	R2	96	0.0	0.516	31.1	LOS D	2.2	15.3	0.86	1.04	1.26	40.4
Approach		456	0.0	0.516	13.3	NA	3.8	26.9	0.70	0.88	1.03	48.7
West: Dabgari Road												
10	L2	74	0.0	0.716	16.8	LOS C	6.6	46.1	0.80	1.13	1.73	46.6
11	T1	368	0.0	0.716	15.8	LOS C	6.6	46.1	0.82	1.14	1.74	46.4
12	R2	137	0.0	0.716	29.3	LOS D	4.6	32.4	0.86	1.17	1.77	42.2
Approach		579	0.0	0.716	19.1	NA	6.6	46.1	0.83	1.14	1.74	45.3
All Vehicles		2004	0.0	0.716	12.3	NA	6.6	46.1	0.63	0.76	1.01	49.4

Source: M/S PEPAC Pvt Ltd & Associates

Figure 33: Dabgari Garden Chowk Site Layout (Current Scenario: PM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 34: Dabgari Garden Chowk Movement Summary (Current Scenario: PM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar-Current Scenario 2022]

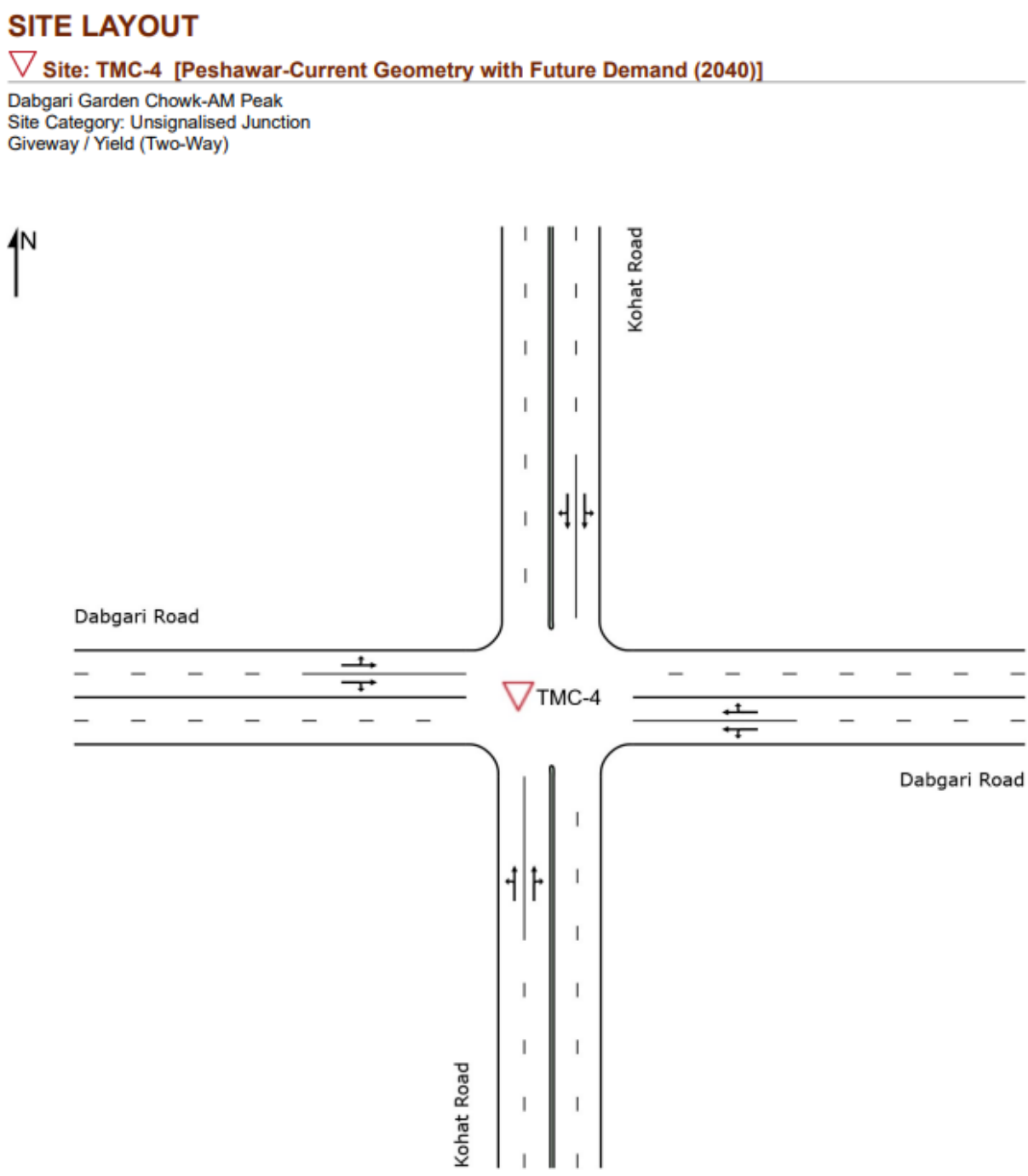
Dabgari Garden Chowk-PM
Site Category: Unsignalised Junction
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	82	0.0	0.053	5.6	LOS A	0.2	1.7	0.13	0.25	0.13	55.7
2	T1	165	0.0	0.053	0.1	LOS A	0.2	1.7	0.13	0.26	0.13	57.2
3	R2	47	0.0	0.053	6.5	LOS A	0.2	1.4	0.13	0.28	0.13	55.8
Approach		295	0.0	0.053	2.6	NA	0.2	1.7	0.13	0.26	0.13	56.5
East: Dabgari Road												
4	L2	72	0.0	0.082	5.5	LOS A	0.0	0.0	0.00	0.26	0.00	56.2
5	T1	92	0.0	0.082	0.0	LOS A	0.0	0.0	0.00	0.26	0.00	57.7
6	R2	76	0.0	0.141	10.0	LOS A	0.5	3.4	0.53	0.79	0.53	50.4
Approach		239	0.0	0.141	4.8	NA	0.5	3.4	0.17	0.43	0.17	54.7
North: Kohat Road												
7	L2	245	0.0	1.967	448.8	LOS F	109.2	764.5	1.00	4.65	11.84	6.9
8	T1	602	0.0	1.967	460.6	LOS F	109.2	764.5	1.00	4.14	11.10	6.9
9	R2	126	0.0	1.967	467.3	LOS F	63.0	441.2	1.00	3.28	9.85	6.8
Approach		974	0.0	1.967	458.5	LOS F	109.2	764.5	1.00	4.16	11.12	6.9
West: Dabgari Road												
10	L2	64	0.0	0.369	6.7	LOS A	2.0	13.8	0.43	0.37	0.43	55.6
11	T1	308	0.0	0.369	2.0	LOS A	2.0	13.8	0.44	0.43	0.45	56.3
12	R2	199	0.0	0.369	9.3	LOS A	1.9	13.2	0.48	0.70	0.56	52.0
Approach		572	0.0	0.369	5.1	NA	2.0	13.8	0.45	0.52	0.49	54.6
All Vehicles		2079	0.0	1.967	217.1	NA	109.2	764.5	0.63	2.18	5.38	12.9

Source: M/S PEPAC Pvt Ltd & Associates

Figure 35: Dabgari Garden Chowk Site Layout (Intermediate Scenario: AM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 36: Dabgari Garden Chowk Movement Summary (Intermediate Scenario: AM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar-Current Geometry with Future Demand (2040)]

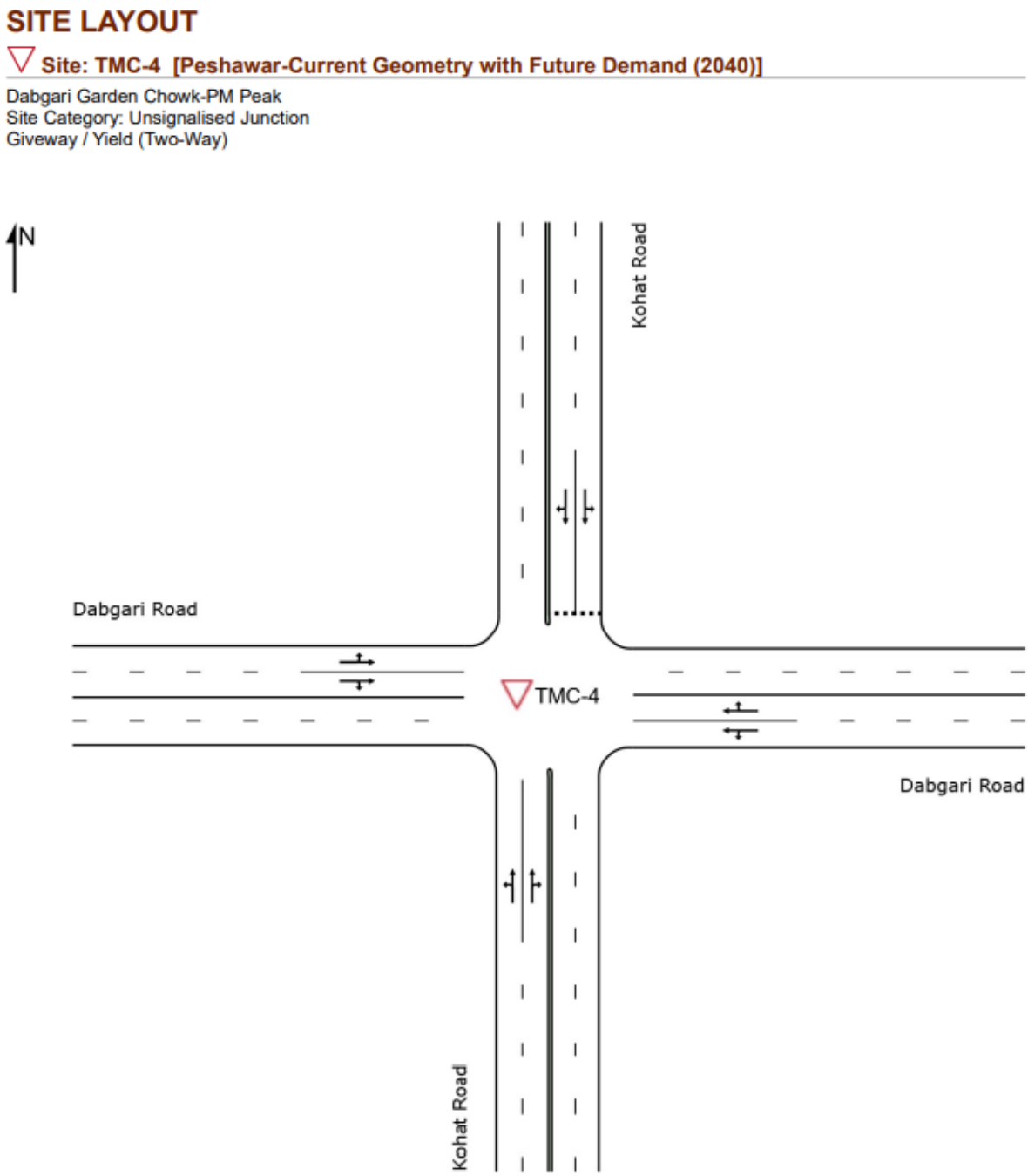
Dabgari Garden Chowk-AM Peak
Site Category: Unsignalised Junction
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	157	0.0	0.505	6.0	LOS A	3.2	22.6	0.28	0.16	0.29	56.7
2	T1	1399	0.0	0.505	0.5	LOS A	3.2	22.6	0.28	0.16	0.29	58.2
3	R2	128	0.0	0.922	74.3	LOS F	4.4	30.9	1.00	1.29	2.33	26.7
Approach		1684	0.0	0.922	6.6	NA	4.4	30.9	0.33	0.25	0.44	53.3
East: Dabgari Road												
4	L2	257	0.0	0.222	6.1	LOS A	1.0	6.8	0.40	0.35	0.40	54.8
5	T1	343	0.0	0.222	0.6	LOS A	1.0	6.8	0.40	0.35	0.40	56.2
6	R2	287	0.0	14.539	6142.3	LOS F	116.5	815.7	1.00	1.61	4.03	0.6
Approach		887	0.0	14.539	1991.1	NA	116.5	815.7	0.60	0.76	1.58	1.7
North: Kohat Road												
7	L2	368	0.0	0.464	7.2	LOS A	2.5	17.7	0.58	0.60	0.80	54.3
8	T1	586	0.0	0.464	1.7	LOS A	2.5	17.7	0.58	0.60	0.80	55.7
9	R2	254	0.0	17.078	7297.6	LOS F	113.0	791.0	1.00	1.46	3.32	0.5
Approach		1208	0.0	17.078	1535.0	NA	113.0	791.0	0.67	0.78	1.33	2.2
West: Dabgari Road												
10	L2	196	0.0	0.896	13.2	LOS B	8.4	58.9	0.95	1.54	3.04	51.3
11	T1	978	0.0	0.896	7.7	LOS A	8.4	58.9	0.95	1.54	3.04	52.6
12	R2	363	0.0	4.523	1611.6	LOS F	99.9	699.6	1.00	2.94	10.10	2.1
Approach		1537	0.0	4.523	387.4	NA	99.9	699.6	0.96	1.87	4.71	8.0
All Vehicles		5317	0.0	17.078	795.3	NA	116.5	815.7	0.63	0.92	2.07	4.2

Source: M/S PEPAC Pvt Ltd & Associates

Figure 37: Dabgari Garden Chowk Site Layout (Intermediate Scenario: PM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 38: Dabgari Garden Chowk Movement Summary (Intermediate Scenario: PM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar-Current Geometry with Future Demand (2040)]

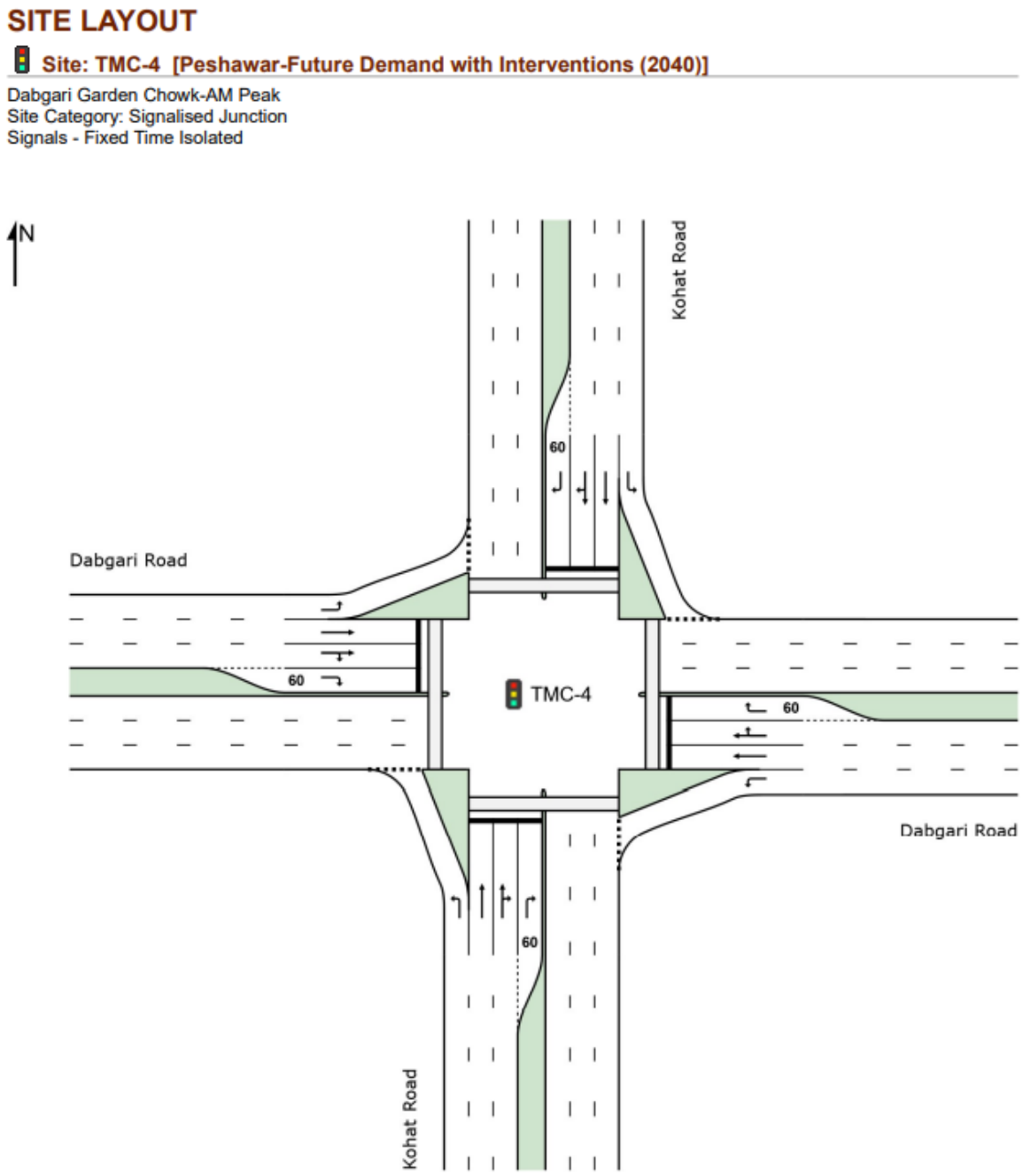
Dabgari Garden Chowk-PM Peak
Site Category: Unsignalised Junction
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	218	0.0	0.192	5.8	LOS A	0.9	6.4	0.24	0.23	0.24	55.7
2	T1	463	0.0	0.192	0.2	LOS A	0.9	6.4	0.27	0.27	0.27	56.7
3	R2	125	0.0	0.192	9.8	LOS A	0.7	4.7	0.42	0.58	0.42	52.8
Approach		806	0.0	0.192	3.2	NA	0.9	6.4	0.28	0.31	0.28	55.8
East: Dabgari Road												
4	L2	189	0.0	0.217	5.6	LOS A	0.0	0.0	0.00	0.26	0.00	56.2
5	T1	243	0.0	0.217	0.0	LOS A	0.0	0.0	0.00	0.26	0.00	57.7
6	R2	201	0.0	0.380	12.8	LOS B	1.4	9.8	0.80	0.97	1.03	48.5
Approach		634	0.0	0.380	5.7	NA	1.4	9.8	0.25	0.49	0.33	54.0
North: Kohat Road												
7	L2	651	0.0	2.709	776.3	LOS F	333.4	2333.5	1.00	11.39	35.31	4.3
8	T1	1598	0.0	2.709	779.6	LOS F	333.4	2333.5	1.00	9.73	31.94	4.3
9	R2	335	0.0	2.709	782.7	LOS F	194.0	1358.2	1.00	7.02	26.45	4.3
Approach		2583	0.0	2.709	779.2	LOS F	333.4	2333.5	1.00	9.80	32.08	4.3
West: Dabgari Road												
10	L2	171	0.0	0.341	6.1	LOS A	1.7	11.9	0.37	0.20	0.37	56.0
11	T1	818	0.0	0.341	0.5	LOS A	1.7	11.9	0.37	0.20	0.37	57.5
12	R2	527	0.0	0.588	10.5	LOS B	3.4	23.6	0.71	1.03	1.20	50.0
Approach		1516	0.0	0.588	4.6	NA	3.4	23.6	0.49	0.49	0.66	54.5
All Vehicles		5539	0.0	2.709	365.8	NA	333.4	2333.5	0.67	4.80	15.22	8.5

Source: M/S PEPAC Pvt Ltd & Associates

Figure 39: Dabgari Garden Chowk Site Layout (Future Scenario: AM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 40: Dabgari Garden Chowk Movement Summary (Future Scenario: AM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar-Future Demand with Interventions (2040)]

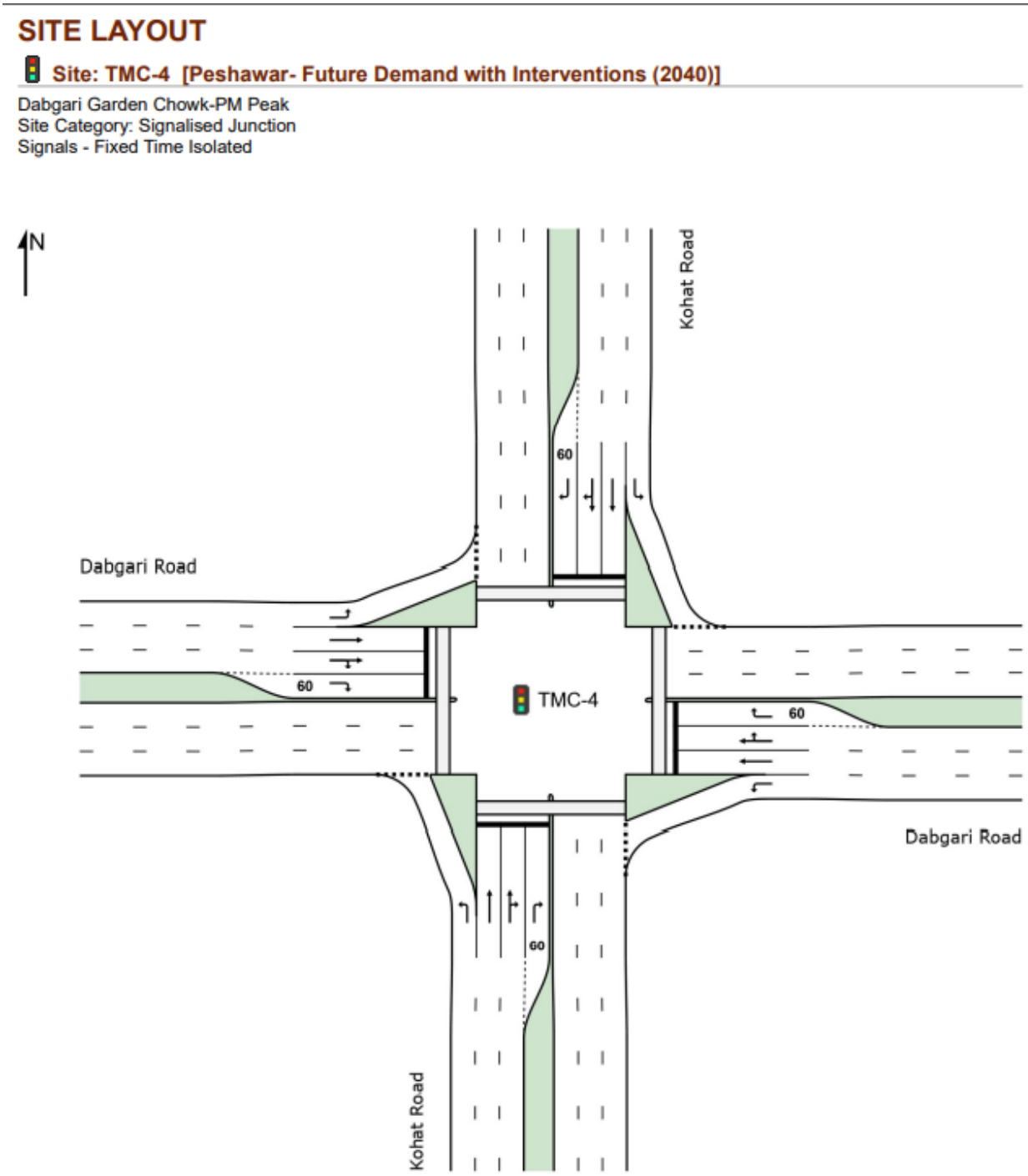
Dabgari Garden Chowk-AM Peak
Site Category: Signalised Junction
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	157	0.0	0.129	10.4	LOS B	2.4	16.6	0.38	0.65	0.38	50.6
2	T1	1399	0.0	1.091	99.0	LOS F	58.6	409.9	1.00	1.43	1.69	22.6
3	R2	128	0.0	0.201	31.4	LOS C	4.5	31.4	0.76	0.74	0.76	39.5
Approach		1684	0.0	1.091	85.6	LOS F	58.6	409.9	0.92	1.30	1.50	24.7
East: Dabgari Road												
4	L2	257	0.0	0.263	13.6	LOS B	5.2	36.6	0.51	0.70	0.51	48.5
5	T1	343	0.0	1.056	92.3	LOS F	15.4	108.1	1.00	1.17	1.75	23.5
6	R2	287	0.0	1.056	98.2	LOS F	15.2	106.2	1.00	1.17	1.75	22.8
Approach		887	0.0	1.056	71.5	LOS F	15.4	108.1	0.86	1.03	1.39	27.3
North: Kohat Road												
7	L2	368	0.0	0.355	11.8	LOS B	6.9	48.5	0.48	0.70	0.48	49.7
8	T1	586	0.0	1.107	109.3	LOS F	23.3	162.8	1.00	1.29	1.84	21.1
9	R2	254	0.0	1.006	84.4	LOS F	16.9	118.2	1.00	1.11	1.60	25.2
Approach		1208	0.0	1.107	74.3	LOS E	23.3	162.8	0.84	1.07	1.38	26.6
West: Dabgari Road												
10	L2	196	0.0	0.224	19.9	LOS B	5.2	36.7	0.63	0.72	0.63	44.8
11	T1	978	0.0	1.094	103.0	LOS F	42.4	296.5	1.00	1.37	1.75	22.0
12	R2	363	0.0	0.890	55.8	LOS E	19.7	137.7	1.00	0.98	1.27	31.3
Approach		1537	0.0	1.094	81.3	LOS F	42.4	296.5	0.95	1.19	1.49	25.4
All Vehicles		5317	0.0	1.107	79.4	LOS E	58.6	409.9	0.90	1.17	1.45	25.7

Source: M/S PEPAC Pvt Ltd & Associates

Figure 41: Dabgari Garden Chowk Site Layout (Future Scenario: PM Peak)



Source: M/S PEPAC Pvt Ltd & Associates

Figure 42: Dabgari Garden Chowk Movement Summary (Future Scenario: PM Peak)

MOVEMENT SUMMARY

Site: TMC-4 [Peshawar- Future Demand with Interventions (2040)]

Dabgari Garden Chowk-PM Peak
Site Category: Signalised Junction
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kohat Road												
1	L2	218	0.0	0.209	9.3	LOS A	2.6	18.3	0.40	0.67	0.40	51.4
2	T1	463	0.0	1.137	110.5	LOS F	16.7	117.2	1.00	1.32	2.16	20.9
3	R2	125	0.0	0.646	45.9	LOS D	5.1	35.5	1.00	0.82	1.09	34.2
Approach		806	0.0	1.137	73.1	LOS E	16.7	117.2	0.84	1.07	1.52	26.8
East: Dabgari Road												
4	L2	189	0.0	0.337	25.8	LOS C	5.4	37.7	0.82	0.77	0.82	41.8
5	T1	243	0.0	0.991	64.2	LOS E	8.0	56.1	1.00	1.08	1.75	29.2
6	R2	201	0.0	0.991	70.1	LOS E	7.9	55.1	1.00	1.08	1.76	28.1
Approach		634	0.0	0.991	54.6	LOS D	8.0	56.1	0.95	0.99	1.48	31.7
North: Kohat Road												
7	L2	651	0.0	0.536	11.0	LOS B	11.5	80.5	0.57	0.74	0.57	50.2
8	T1	1598	0.0	1.138	108.3	LOS F	66.1	462.9	1.00	1.63	2.00	21.4
9	R2	335	0.0	0.460	26.1	LOS C	9.9	69.5	0.80	0.80	0.80	41.9
Approach		2583	0.0	1.138	73.1	LOS E	66.1	462.9	0.87	1.30	1.49	27.0
West: Dabgari Road												
10	L2	171	0.0	0.140	8.2	LOS A	1.7	11.7	0.34	0.64	0.34	52.2
11	T1	818	0.0	1.132	108.2	LOS F	33.7	236.0	1.00	1.47	2.05	21.2
12	R2	527	0.0	1.132	114.1	LOS F	32.7	228.8	1.00	1.38	2.06	20.6
Approach		1516	0.0	1.132	99.0	LOS F	33.7	236.0	0.93	1.35	1.86	22.5
All Vehicles		5539	0.0	1.138	78.1	LOS E	66.1	462.9	0.89	1.24	1.59	26.0

Source: M/S PEPAC Pvt Ltd & Associates

3. Existing Signage Inventory

Table 62: Existing Signage Inventory of major roads of Peshawar

Informational Sign: At Chamkani Road **Coordinates:** 34.017388°N, 71.62626°E	**Directional Sign:** At Chamkani Road **Coordinates:** 34.017433°, 71.629495°E
Regulatory Sign: At Chamkani Road **Coordinates:** 34.017685°N, 7163195°E	**Directional Sign:** At Chamkani Road **Coordinates:** 34.017494°N, 71.634186°E
Directional Sign: At Chamkani Road **Coordinates:** 34.017947°N, 71.63416°E	**Directional Sign:** At Chamkani Raod **Coordinates:** 34.019548°N, 71.649763°E

Directional Sign: At Chamkani Road **Coordinates:** 34.019247°N, 71.640924°E	**Informational Sign:** At Chamkani Road **Coordinates:** 34.019067°N, 71.639623°E
Regulatory Sign: At Chamkani Road **Coordinates:** 34.017864°N, 71.630445°E	**Regulatory Sign:** At Chamkani Road **Coordinates:** 34.017808°N, 71.629826°E
Informational Sign: At Chamkani Road **Coordinates:** 34.017686°N, 71.628931°E	**Informational Sign:** At PeshawarRoad **Coordinates:** 34.05475°N, 71.586388°E

Regulatory Sign: At Charsadda Road **Coordinates:** 34.053733°, 71.585234°E	**Informational Sign:** At Charsadda Road **Coordinates:** 34.058575°N, 71.587236°E
Regulatory Sign: At Charsadda Road **Coordinates:** 34.059667°N, 71.58806°E	**Directional Sign:** At Charsadda Road **Coordinates:** 34.031795°N, 71.578105°E
Directional Sign: At Charsadda Raod **Coordinates:** 34.024286°N, 71.573834°E	**Directional Sign:** At Dalazak Road **Coordinates:** 34.047888°N, 71.521033°E
Regulatory Sign: At Motorway Road	**Informational Sign:** At Motorway Road

Coordinates: 34.02521°N, 71.630628°E	**Coordinates:** 34.026876°, 71.643417°E
Directional Sign: At Motorway Road **Coordinates:** 34.025975°N, 71.63993°E	**Informational Sign:** At Pajaggi Road **Coordinates:** 34.055242°N, 71.541593°E
Directional Sign: At Pir Bala Road **Coordinates:** 34.076128°N, 71.477758°E	**Directional Sign:** At Pir Bala Road **Coordinates:** 34.101367°, 71.440673°E
Informational Sign: At Hayatabad Bara Road **Coordinates:** 33.95476°N, 71.419448°E	**Informational Sign:** At Bara Road **Coordinates:** 33.967267°N, 71.510724°E
Informational Sign: At Bara Road **Coordinates:** 33.958334°N, 71.503017°E	**Informational Sign:** At Bara Road **Coordinates:** 33.953944°N, 71.499023°E

Informational Sign: At Bara Road **Coordinates:** 33.956592°N, 71.501108°E	**Informational Sign:** At Bara Road **Coordinates:** 33.963024°N, 71.500929°E
Regulatory Sign: At Bara Road **Coordinates:** 33.964949°N, 71.49721°E	**Directional Sign:** At Bara Road **Coordinates:** 33.973166°N, 71.516336°E
Informational Sign: At Jamrud Road **Coordinates:** 33.964949°N, 71.49721°E	**Directional Sign:** At Jamrud Road **Coordinates:** 33.996677°N, 71.453872°E
Regulatory Sign: At Jamrud Road **Coordinates:** 33.997151°N, 71.452032°E	**Directional Sign:** At Jamrud Road **Coordinates:** 33.998058°N, 71.46824°E

Directional Sign: At Jamrud Road **Coordinates:** 33.998617°N, 71.422304°E	**Directional Sign:** At Nasir Bagh Road **Coordinates:** 34.024652°N, 71.452155°E
Directional Sign: At Peshawar Ring Road **Coordinates:** 33.960611°N, 71.5055°E	**Directional Sign:** At Peshawar Ring Road **Coordinates:** 33.9605352°N, 71.5055°E
Directional Sign: At Peshawar Ring Road **Coordinates:** 33.973515°N, 71.477326°E	

Source: M/S PEPAC Pvt Ltd & Associates

4. Proposed Signage Inventory

Table 63: Proposed signage inventory of major roads of Peshawar

Informational Sign (Slow Speed Sign) : At Pajaggi Road **Coordinates:** 34.050813°N, 71.542912°E	**Informational Sign (Market Sign) & Regulatory Sign (Slow Speed Sign) needed:** At Pir Bala Road **Coordinates:** 34.060645°N, 71.510729°E
Directional Sign (U-Turn Sign) needed: At Pir Bala Road **Coordinates:** 34.060645°, 71.510729°E	**Informational Sign Needed:** At Hayatabad-Bara Road **Coordinates:** 33.965183°,7.411848°
Directional Sign needed: At Bara Road **Coordinates:** 33.973197°, 71.516275°E	**Informational Sign needed:** At Bara Road **Coordinates:** 33.963009°, 71.501025°E

Directional Sign needed: Jamrud Road **Coordinates:** 33.998074°, 71.403144°E	**Informational Sign (Market Sign) needed:** Jamrud Road **Coordinates:** 33.998657°, 71.421672°E
Directional Sign (U-turn sign) needed: Jamrud Road **Coordinates:** 33.99737°, 71.435689°E	**Informational Sign (Bridge sign) needed:** Nasir Bagh Road **Coordinates:** 34.063017°, 71.406002°E
Informational Sign (Hospital Sign) needed: Nasir Bagh Road **Coordinates:** 34.062344°, 71.409055°E	**Informational Sign needed:** Nasir Bagh Road **Coordinates:** 34.062344°, 71.409055°E

Informational Sign (School Sign) needed: Nasir Bagh Road **Coordinates:** 34.016366°, 71.457896°E	**Informational Sign (Bridge Sign) needed:** Nasir Bagh Road **Coordinates:** 34.068358°, 71.400552°E
Informational Sign (School Sign) needed: Peshawar Ring Road **Coordinates:** 33.973752°, 71.460874°E	**Directional Sign (U-Turn) needed:** Peshawar Ring Road **Coordinates:** 33.974831°, 71.466038°E

Source: M/S PEPAC Pvt Ltd & Associates